



**Washington State
Department of Transportation**
Highways & Local Programs Division



BUILD A BETTER MOUSE TRAP WST2

Washington State Technology Transfer Center-Highways & Local Programs

Introduction

The Washington State Technology Transfer Center (WST2) started the *“Build a Better Mousetrap”* program in the year 2000. The purpose of the program is to:

- Recognize the initiative and innovative thinking of public agency transportation staff in the development of tools, equipment modifications, and processes that increase safety, reduce cost, improve efficiency, and improve the quality of transportation.
- Identify and help distribute ideas created in the field so others can duplicate them and implement them.
- Promote continued improvement.

Crystal Mouse Awards

Ideas big and small compete for the *“Crystal Mouse Award”* to be presented by WST2 and the Washington Partnerships for Quality Transportation (WQPT) to the best mousetrap from several different categories each year.

Crystal Mouse Awards are presented to the team (the inventor, the fabricator, and the supervisor) that produced the best “mousetrap,” with special recognition given to the inventor.

Two awards are selected as “Best of Show” by the attendees of the Pacific Northwest Transportation Technology Expo as part of the “Build a Better Mousetrap” portion of the Expo. The two award categories are the best tool and best equipment/equipment modification.

The WST2 Advisory Committee selects a third award as the best “mousetrap” published in the WST2 Newsletter during the past year based on the following criteria:

- Safety (Did it improve transportation or environmental safety?)
- Cost Savings (Did it save money?)
- Inventiveness (How creative was it?)
- Transportability (How broadly can the mousetrap be used in agencies across the state?)
- Effectiveness (Did it solve the problem?)

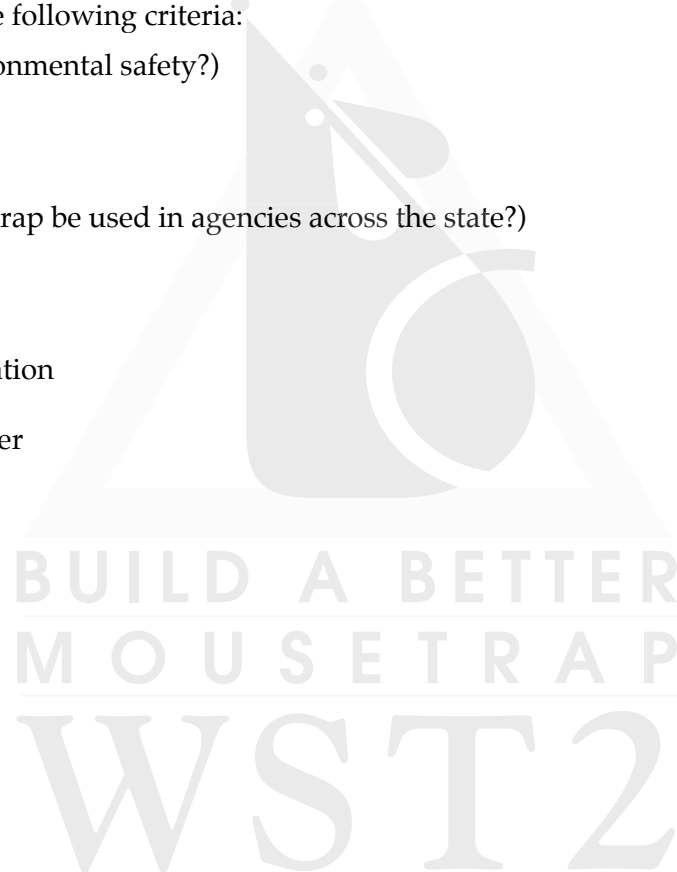
For more information, contact the WST2 Center at:

Washington State Department of Transportation
Highways & Local Programs Division
Washington State Technology Transfer Center
P.O. Box 47390
Olympia, WA 98504-7390

Phone: (360) 705-7386

Fax: (360) 705-6858

E-mail: WST2Center@wsdot.wa.gov



Contents

Page

Introduction	i
-------------------------------	---

2002 Crystal Mouse Award Winners	1
The Best Tool for 2002 – Jackhammer Storage Unit	2
Best Equipment for 2002 – Gravel Road Maintainer	2
Best Mousetrap Published in 2002 – Under Guardrail Cleaner	3

2001 Crystal Mouse Award Winners	5
The Best Tool for 2001 – Snowplow Bit Changer	6
Best Equipment/Equipment Modification for 2001 – Debris Pusher	7
Best Mousetrap Published in 2001 – Snowplow Emergency Light System	8

2000 Crystal Mouse Award Winners	9
Delineator Post Punch	9

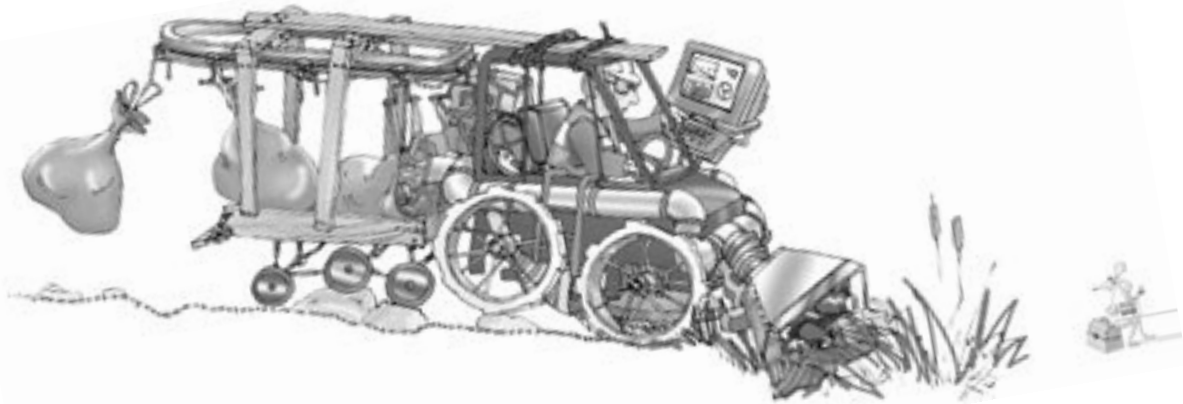
Mousetraps	
Cone Setting Cage	11
Saw Trailer	13
Guardrail Bolt Puller	17
Asphalt Patching Grader Attachment	19
Enclosed Sander Heating System	23
Portable Sign Washer-Rinsing Pump	25
Guardrail Post Screw	27
Mobile Work Zone Traffic Control Cone and Sign Storage	29
Under Guardrail Cleaner	33
Culvert Cleaning and Relining Process	37
Chip Seal Hitch	41
Bobcat Grinder Asphalt Screed	43
Temporary Sign Support for Jersey Barriers	45
Buffer Sign Receiver	47
Snowplow Stands and Lifting Lever	49
Debris Pusher	51
Snowplow Bit Changer	55
Snowplow Emergency Light System	57
Tack Distributor Waste Diesel Recycling System	59
Breakaway Sander Spinner	61
Culvert Template	63
Catch Basin Grate Jack	65

Registration	Back Page
-------------------------------	-----------

Crystal Mouse Award Winners



Congratulations to the 2002 Crystal Mouse Award Winners!



*By Dan Sunde, Former Technology
Transfer Engineer, WST2 Center*

WSDOT's WST2 Center announce the winners of the 2002 Crystal Mouse Awards. Each year the WST2 Advisory Committee selects the best idea published in the WST2, the WST2 Center's newsletter, and the attendees at the Pacific Northwest Transportation Technology Expo vote for the best of show in two categories: hand tools and equipment. This year the WST2 Advisory Committee selected the WSDOT Southwest Region's Under Guardrail Cleaner invented by Jack Moltz and Daryl Sprague in the WSDOT Chehalis Maintenance Shop. The selection was based on five criteria:

1. Safety
2. Cost Savings
3. Inventiveness
4. Transportability
5. Effectiveness

The city of Oak Harbor's Jack Hammer Storage Unit, invented by Keith Jameson, received the most votes at the 2002 Tech Expo for the best tool. Douglas County took the honors for the best equipment with the Gravel Road Maintainer invented by the team of Ken Willms, Dave Mires, Robert Mires, Dell Mires, and Lyle Eggers.

Congratulations to the winners for their initiative and creative thinking in reducing cost, increasing safety and improving efficiency!

"Thank you" to all of you that participated in the Pacific Northwest Transportation Technology Expo and the Build a Better Mousetrap program in 2002.

If you haven't submitted your mousetrap for publication in the WST2, please do so. It will help us get the word out so others can reap the benefits of your invention and give us a chance to acknowledge you for your idea.

Just fill out the application form enclosed in the newsletter and include as many photos as possible (please include photos of the inventors and fabricators too) and sketches with dimensions, then mail it to us at:

*Build a Better Mousetrap
WST2 Center-WSDOT
P.O. Box 47390
Olympia, WA 98504-7390*

The Best Tool for 2002 – Keith Jameson's Jackhammer Storage Unit

*Inventor & Fabricator: Keith Jameson
Supervisor: Ed McNeill*

The Jackhammer Storage Unit stores a jackhammer vertically on a steel peg mounted on a hinged plate inside a truck's utility box. The base plate is mounted on the bottom of the storage compartment and is piano hinged to allow the peg to rotate outward for easy access. With the unit mounted at waist height, these features combine to allow quick and safe storage and retrieval of the heavy tool.

A similar hinged plate assembly is mounted behind the jackhammer storage hinge assembly with several pegs to store the various bits used.

Keith reports the tools are better organized and there is far less chance of back injury in accessing and storing the jackhammer.



Best Equipment for 2002 – Douglas County's Gravel Road Maintainer

*Inventors & Fabricators: Ken Willms,
Dave Mires, Robert Mires, Dell Mires,
and Lyle Eggers
Supervisor: Ken Willms*

The Gravel Road Maintainer is a mini-grader that is towed behind a pickup truck. All adjustments of the blade are hydraulically controlled inside the pickup. The Gravel Road Maintainer greatly improves efficiency and quality of work in maintaining unsurfaced roads. This sophisticated piece of equipment was designed and built by an ingenious team made up of Ken Willms, Dave Mires, Robert Mires, Dell Mires, and Lyle Eggers.



**Best Mousetrap Published in 2002 –
Jack Moltz and Daryl Sprague's**

Under Guardrail Cleaner

*Inventors: Jack Moltz and
Daryl Sprague*

Fabricator: Bob Steel

Supervisor: Larry Stritmatter

Superintendent: Paul Simonsen

The Under Guardrail Cleaner is an A-frame shaped blade that mounts to the bucket of a Cat mini-excavator. The Cleaner fits between the guardrail posts and allows the debris that has collected under the guardrail to be swept away for removal and reshaping the shoulder. The Cleaner has reduced the cleaning crew from 8 to 3, allowed daytime operations which couldn't be used before due to lane closures, replaced a lane closure with a shoulder closure, and increased the rate of cleaning from 1,000 feet per day to over 5,300 feet per day.

The Under Guardrail Cleaner has saved time, improved traffic flow, reduced crew exposure to traffic, and cut costs. ▲



The Washington State Technology Transfer Center Announces the 2001 Crystal Mouse Award Winners!



Congratulations to our three Crystal Mouse Award Winners at the 2001 Pacific Northwest Transportation Technology Expo!

WSDOT North Central Region maintenance team's Snowplow Bit Installer was voted the best tool presented at the Expo and the WSDOT Olympic Region maintenance team's Debris Pusher was voted the best equipment modifica-

tion presented at the Expo. WST2 Advisory Committee judged the WSDOT South Central Region maintenance team's Snowplow Emergency Light System the best mousetrap published in the WST2 newsletter during the year 2001!

Doug MacDonald, Secretary of Transportation, and Dan Sunde, Director of the WST2 Center, presented the awards to the winners during a full-house Transportation Commission meeting, January 9, 2002.



(Top) Left to right: Dan Gates, Charlie Jensen (with Stetson) and Linda Dougherty

(Bottom) The Snowplow Bit Installer

The Best Tool for 2001 – Charlie Jensen's Snowplow Bit Changer

The snowplow bit changer was invented and fabricated by Charlie Jensen, Maintenance Tech 2 of the WSDOT Maintenance Shop in Twisp with support from his supervisor Linda Dougherty and superintendent Dan Gates.

This ingenious piece of equipment increases safety by reducing the need to lift snowplow bits and holding them in place while they are mounted, protecting workers from sprained backs, pulled muscles, twisted knees, and smashed fingers. It also increases

efficiency by allowing one person to install the bits rather than two. A 40-minute two-person job has been reduced to a 20-minute one-person task.

There are plans now to fabricate this tool for the other shops in the North Central Region.

For more information, photos, and a schematic to show you how to build Charlie's Snowplow Bit Installer for your shop, read the Mousetrap section of the Summer 2001 edition of the WST2, Issue 71, page 30.



(Top) From Left to right, Mike Evans, Jon Moergen (back), Jerry Lowery, and Dennis Ulmer

(Bottom) The Debris Pusher

The Best Equipment/Equipment Modification for 2001 – Jerry Lowery's

Debris Pusher

The Debris Pusher was invented by Jerry Lowery, Maintenance Tech 2 in the WSDOT Lakewood Shop, Tacoma and fabricated by Jon Moergen, Suspension Bridge Specialist, Narrows Bridge, Tacoma with support from their supervisors, Dennis Ulmer, Mike Evans, and former superintendent, Casey McGill.

The Debris Pusher is a large metal basket with wire brushes along the bottom that mounts to the front of a truck using the snowplow attachment. This very effective piece of equipment provides safety to maintenance crews and the traveling public as well as maintains traffic

flow on highways by capturing debris lying in traffic lanes without requiring the truck to stop. The Debris Pusher collects debris as large as a car hood at highway speeds, allowing the driver to work across the traffic lanes to the shoulder where the debris can be thrown into the back of the truck for disposal. The Debris Pusher allows dangerous traffic hazards to be removed safely without disrupting traffic.

For more information, photos, and detailed drawings to show you how to build Jerry's Debris Pusher for your shop, read the Mousetrap section of the Fall 2001 edition of the WST2, Issue 72, page 40.



*(Left) Errol Rhode
(Top) The Snowplow Emergency
Light System*

Best Mousetrap Published in 2001 – Snowplow Emergency Light System

Errol Rhode, Equipment Supervisor in the WSDOT Yakima shop invented and fabricated the Snowplow Emergency Light System with support from his former supervisor, Jerry Mearns.

The light system improves safety for the traveling public and maintenance equipment operators by allowing brake lights and turn signals to be more visible during operations when flashing caution lights are in use. The system turns the flashing caution lights off for two seconds whenever the driver

pushes the brake pedal or activates the turn signals. With the caution lights turned off the brake lights and turn signals are isolated and stand out. This provides a clear warning to nearby drivers that the maintenance vehicle is about to slow down, stop, change lanes, or turn. After two seconds the caution lights automatically resume operation.

Errol's design has the taillights and turn lights mounted in a stainless steel light bar at the top of the sand hopper for better visibility and to reduce corrosion. The design also

includes an airfoil mounted over the light bar to blow air across the lights to keep snow from building up on them.

For more information, photos and detailed drawings to show you how to build Errol's Snowplow Emergency Light System, read the Mousetrap section of the Summer 2001 edition of the WST2, Issue 71, pages 32 and 33.

Once again, congratulations to this year's Crystal Mouse Award winners!

And a hearty "Thank you" to all of you that shared your ideas with your participation in the 2001 Pacific Northwest Transportation Technology Expo and submission of mousetraps for publication in the WST2.

If you haven't submitted your mousetrap for publication in the WST2 Newsletter, I would like to encourage you to do so. It gives the WST2 Center an opportunity to recognize you for your idea and to distribute it so others can benefit. Just fill out the form in the Mousetrap section of this issue and send it to me along with sketches or drawings showing the dimensions and identifying the parts and as many photos as you can. You don't need to have it perfect; we will work with you to polish it up. Submit your mousetrap to:

Build a Better Mousetrap
WST2 Center-WSDOT
P.O. Box 47390
Olympia, WA 98504-7390 ▲

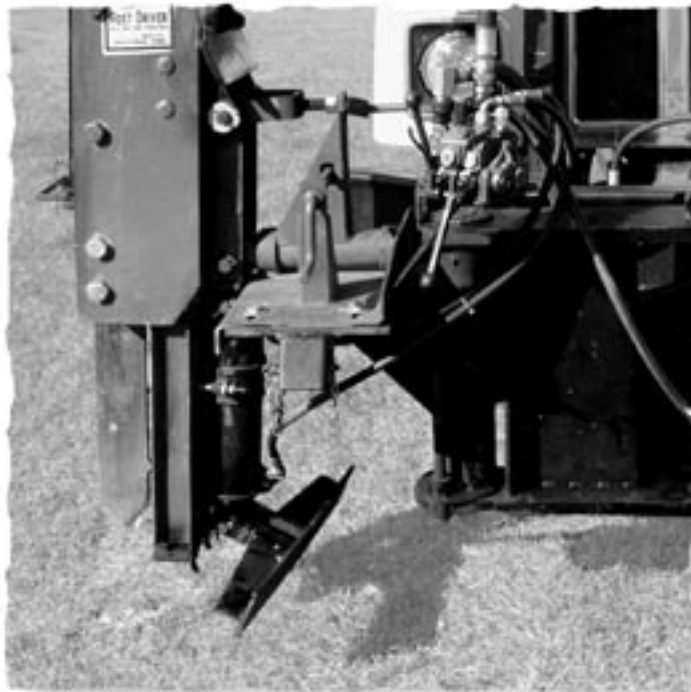
Delineator Post Punch

Wins 2000 Crystal Mouse Award!

*By Dan Sunde, Former
Director WST2*

Roy Gilliam, Lead Tech, and Maintenance Techs Joel F. Havlina and Jim Crownover from Area 3 in WSDOT South Central Region demonstrated the first Crystal Mouse Award winner at the Pacific Northwest Transportation Technology Expo 2000. The men presented a Delineator Post Punch built by Errol Rhode and Jimmye Crawford that is the result of a desire to improve the safety and efficiency of doing a job. Expo attendees voted it the best innovation by a public agency. The WSDOT South Central Region Team received the award from Paula Hammond, Assistant Secretary for Highways & Local Programs Service Center, and Dan Sunde, Director of the Washington State Technology Transfer Center, on December 7.

The Crystal Mouse Award is sponsored by the WST2 Center and Washington Partnerships for Quality Transportation (WPQT) to acknowledge creative ideas that promote work efficiency, cost reduction, and improvements in transportation quality.



*The resulting labor-
saving piece of
equipment reduces
injuries, saves
time, and increases
productivity.*

So, how did this invention come to be? Ten years ago in the South Central Region, delineators were driven by hand. It was slow, back-breaking work that resulted in low productivity and many crew members developing back strain. Tom Root, Maintenance Supervisor for the East Selah Area at the time, noticed workers in a vineyard driving posts with a machine

mounted on a tractor. He bought one and used it for installing delineators, but the device, center-mounted on a tractor with a 3-point hitch, had drawbacks. The holes were not vertical, as one tractor wheel was usually in the ditch. Mechanics Don Remily and Howard Ocobock of WSDOT South Central Region worked up an I-beam mount for the post punch on the front of a dump truck that used the truck's hydraulics as a carrier of the post driver as it moved to the left and right. Their original invention is still in use.

Errol Rhode and Jimmye Crawford, mechanics in the WSDOT South Central Region Yakima Maintenance Shop, improved the mounting attachment to WSDOT'S dump trucks. The ingenious duo designed a double knuckle boom to replace the original three-point



Opposite page: A close-up view of Errol Rhode's and Jimmye Crawford's award winning Delineator Post Punch.

To left: Jim Crownover demonstrates the post punch to a very interested crowd. The Delineator Post Punch drew a lot of attention during the 3-day event.

I beam mounting assembly. This mechanism allows it to swing on a center point pivot on a standard snowplow frame. The punch can swivel from the left side of the truck to the right side, greatly improving its usability. They then tied the hydraulic system of the punch into the snowplow's hydraulic system.

The resulting labor-saving piece of equipment reduces injuries, saves time, and increases productivity. According to Roy, Joel, and Jim, it works great in all types of soil, including clay and rocky soil.

How does it work? Basically, it works like a mini pile driver. It hydraulically lifts a steel blade and drives it into the ground, leaving a slotted hole in the ground to into which a delineator is inserted. It usually only takes one or two punches to get the hole to the proper depth. The punch drew a lot of attention at the Expo.

If you'd like more information, Jimmye and Errol will be willing to fill you in on the details. They can be reached at (509) 575-2575.



Exhibitors Jim Crownover (lt.) and Joel Havlina (rt.)

Congratulations to the WSDOT South Central Region Maintenance Team for your remarkable invention, and thank you Roy, Joel, and

Jim for submitting the information on this "Better Mousetrap," and taking the time to demonstrate it at the Expo! ▲

Mousetraps



Dan Haupt's Cone Setting Cage

By Dave Sorensen, WST2 Traffic Technology Engineer

We all know traffic control operations is not a job for the faint of heart. This is serious business and takes careful planning and coordination among crews out on Washington's roadways. Dan Haupt, Transportation Equipment Fund (TEF) Mechanic working out of the WSDOT Colfax Maintenance Office, had an idea to improve traffic control operations while saving time, money, and providing a faster, safer way to set out and pick up traffic cones. The cone-setting cage Dan fabricated may not have been a new idea; others use similar equipment. However, Dan needed a cone-setting cage that would fit the trailer-hitch receivers on all the pickup trucks in their fleet. Taillights were also added to the cage for improved visibility and safety. The lights are wired to plug into the trailer light receptacle on any of their trucks.

This "Better Mousetrap" was built in-house with new and scrap materials at a cost of about \$200. The design is simple and effective. A one-inch by two-inch square tubing lays the framework, which was covered with steel diamond mesh on the front, floor, and rear of the cage. A hitch receiver "slug" was welded on the back of the unit. A scrap plastic pick-up bed liner was bolted to the diamond mesh on the backside of the unit. The liner is used to shield workers from mud and debris from the trucks rear tires.



Top Photo: Dan Haupt stands next to his Cone Setting Cage.

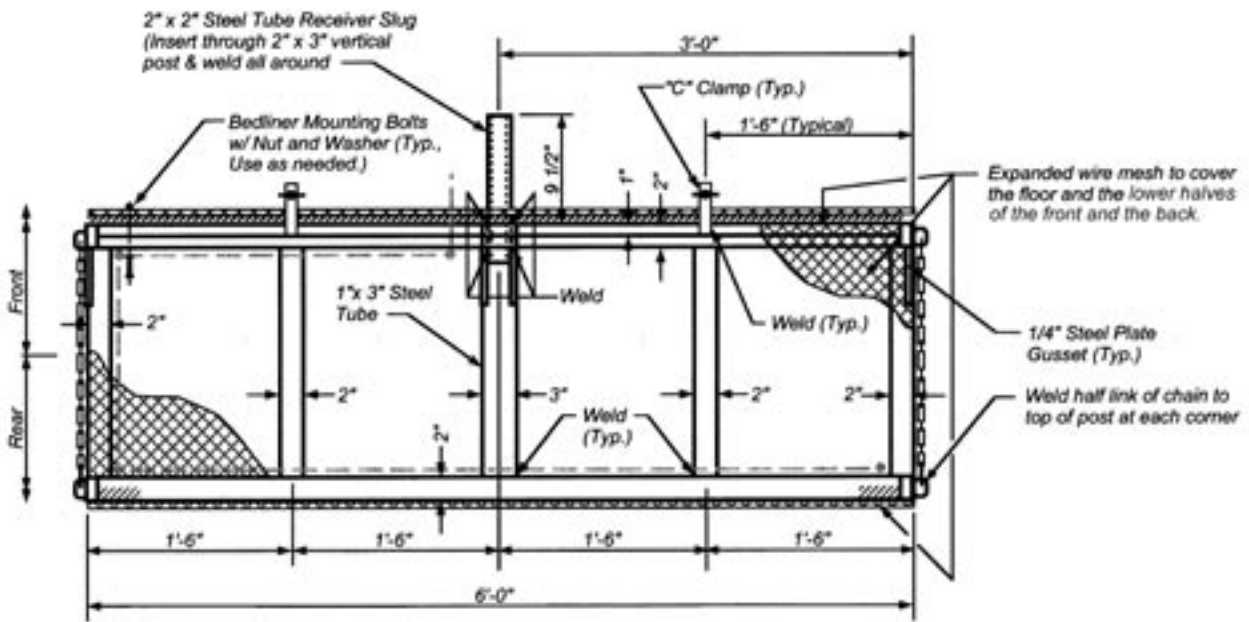
Left Photo: Side view with safety chains in place.

With Dan's innovations, cones are now easily set and retrieved more efficiently. Setting up and breaking down traffic control quickly benefits road crews and motorists alike.

Our hats off to Dan for taking a good concept and making some great improvements! ▲

Dan Haupt welcomes questions about the cone setting cage and can be reached at (509) 397-3051 or email at HauptC@wsdot.wa.gov.





TOP VIEW

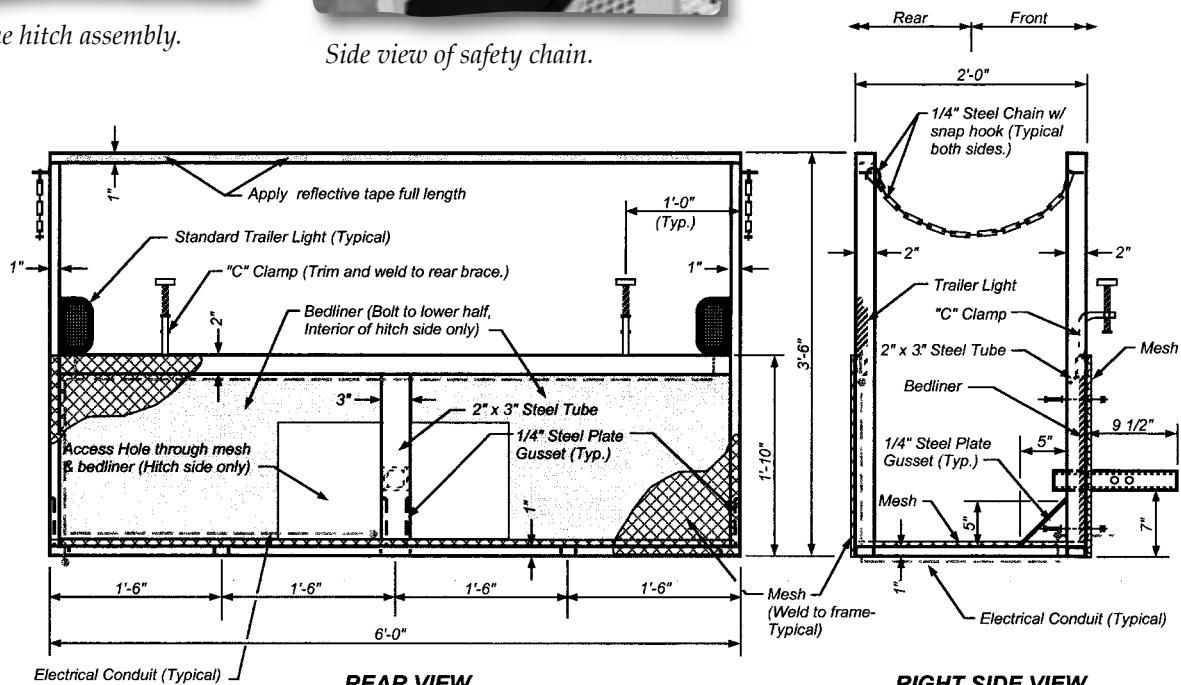
All members are 1"x 2" Steel Tubing (except as noted) welded together.



Backside of the hitch assembly.



Side view of safety chain.



All members are 1"x 2" Steel Tubing (except as noted) welded together.

Gordon Olsen and Bradley Bloodgood's Saw Trailer

By Bob Brooks, WST2 Pavement Technology Engineer

About two years ago, Gordon Olson, City of Tacoma Public Works Concrete Supervisor, wondered if there wasn't a better method for conducting their necessary sawing operations on city streets, curbs, and sidewalks when repairs were needed. He approached Bradley Bloodgood, a former shipbuilder and current fabricator and welder at the City's Fleet Operations Center, to see what could be done. Bradley took an existing saw trailer used by the City and completely redesigned it, adding several innovative improvements and greatly expanding the functionality of the piece of equipment.

The resulting concrete saw trailer is a dedicated piece of equipment used for making cuts in PCC concrete streets, sidewalks, and curbs. It was designed and built in response to environmental concerns and the Endangered Species Act (ESA). This new trailer proved to be so effective at mitigating the environmental impacts of sawing operations that Bradley took the 15-year old original saw trailer, with its limited functionality, and rebuilt it to incorporate many of the improvements designed into the new trailer. The older trailer, with its smaller capacity, is now dedicated to sawing operations in asphalt concrete pavement.

The platform used for the new concrete saw trailer is a 12-foot double axle trailer purchased for \$2,000. The City spent an additional \$2,640 for parts to complete the trailer. The main component of the trailer



Rear view.

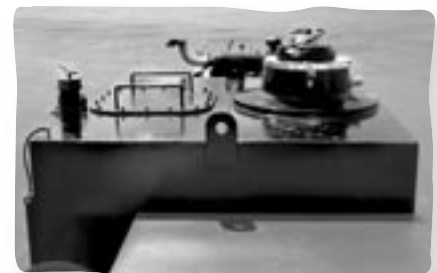
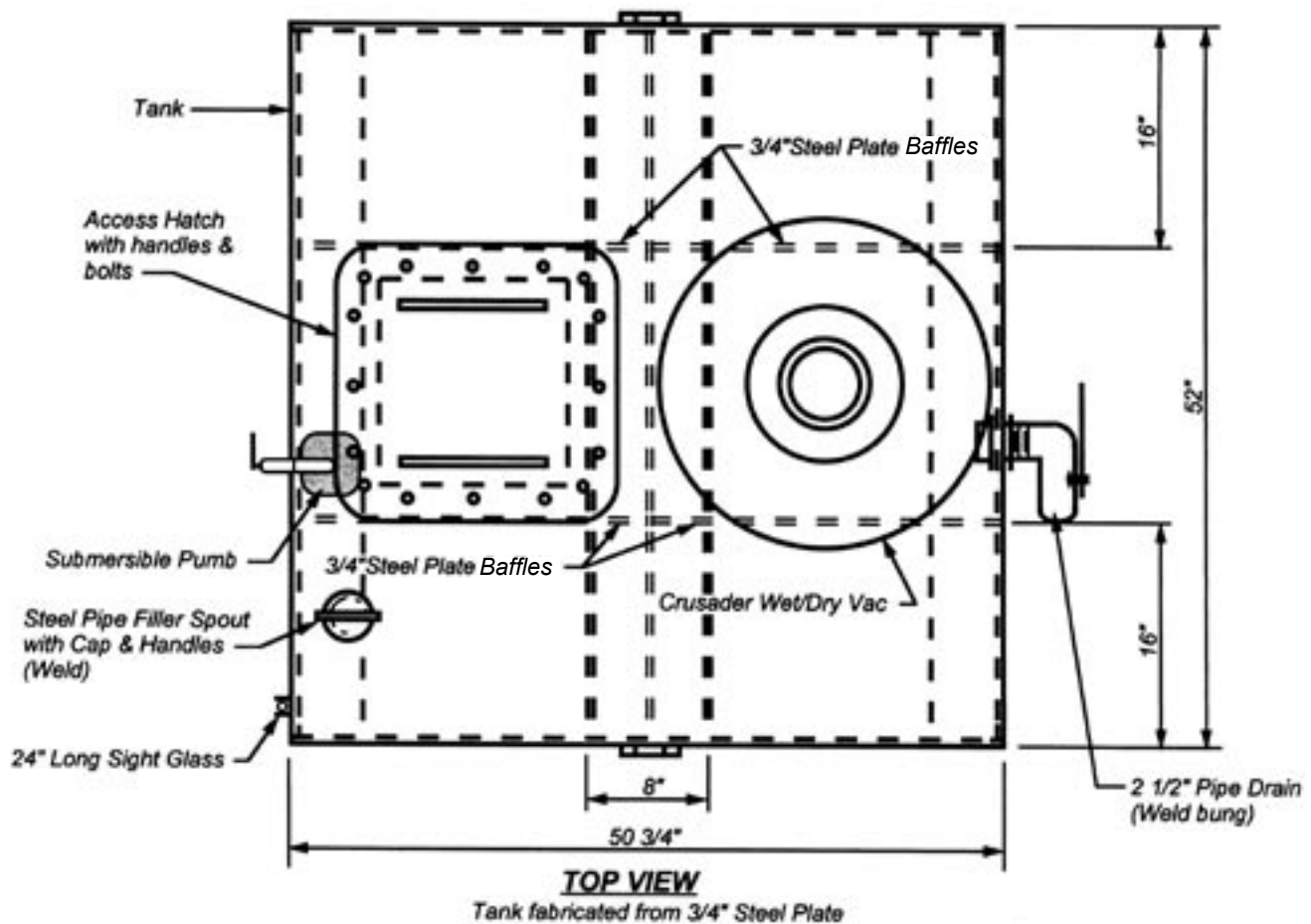


Side view.

is a 600-gallon double compartment water tank. The tank is split equally, 300-gallons each side, between a fresh water supply and a capture compartment used to hold the spent water from the sawing operation. The tank capacity was designed so that the trailer, when fully loaded, would not exceed the maximum legal weight limit.

Each compartment in the tank contains two baffles used to keep the load stable when traveling. The fresh water compartment is fitted

with an access panel large enough to allow access to an electric submersible pump that feeds a 30-foot hose stored on a reel on the trailer. The hose is attached to the self-powered concrete saw to provide cooling, lubrication, and to carry away concrete waste material from the sawing operation. The 300-gallon capacity provides enough water for a half-day of sawing before the tank needs to be refilled. The tank is fitted with a sight glass that shows the amount of water remaining in the tank.



Top of tank.

The other half of the tank is devoted to storing wastewater. It is fitted with a Crusader wet/dry vacuum system connected to a hose with an adjustable nozzle. The nozzle is directed in such a way that it picks up wastewater from the sawing operation. Bradley estimates that the recovery system is 90% efficient at capturing the water used, picking up 9 gallons of every 10 gallons used. The waste compart-

ment has a discharge valve located on the side of the tank that allows for quick discharge of the wastewater into the water collection system at the Operations Center.

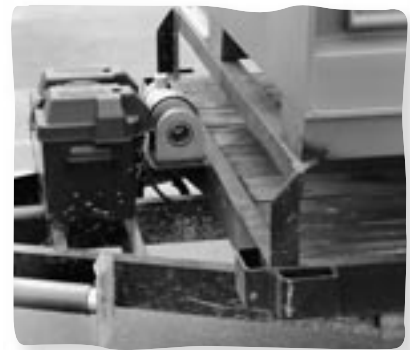
Additional innovations built into the trailer include an electric winch located on the front of the trailer that passes a cable through a channel built into the bottom of the water tank. The winch is connected to the saw and is used to

help secure the saw in place on the trailer bed; it can also be used to pull the saw up onto the trailer in the event the self-powered saw is inoperable. The back of the trailer is equipped with a pullout ramp used for loading and unloading the saw from the trailer. The trailer also has a built-in toolbox used for storing hoses and other miscellaneous items that may be needed on the job.

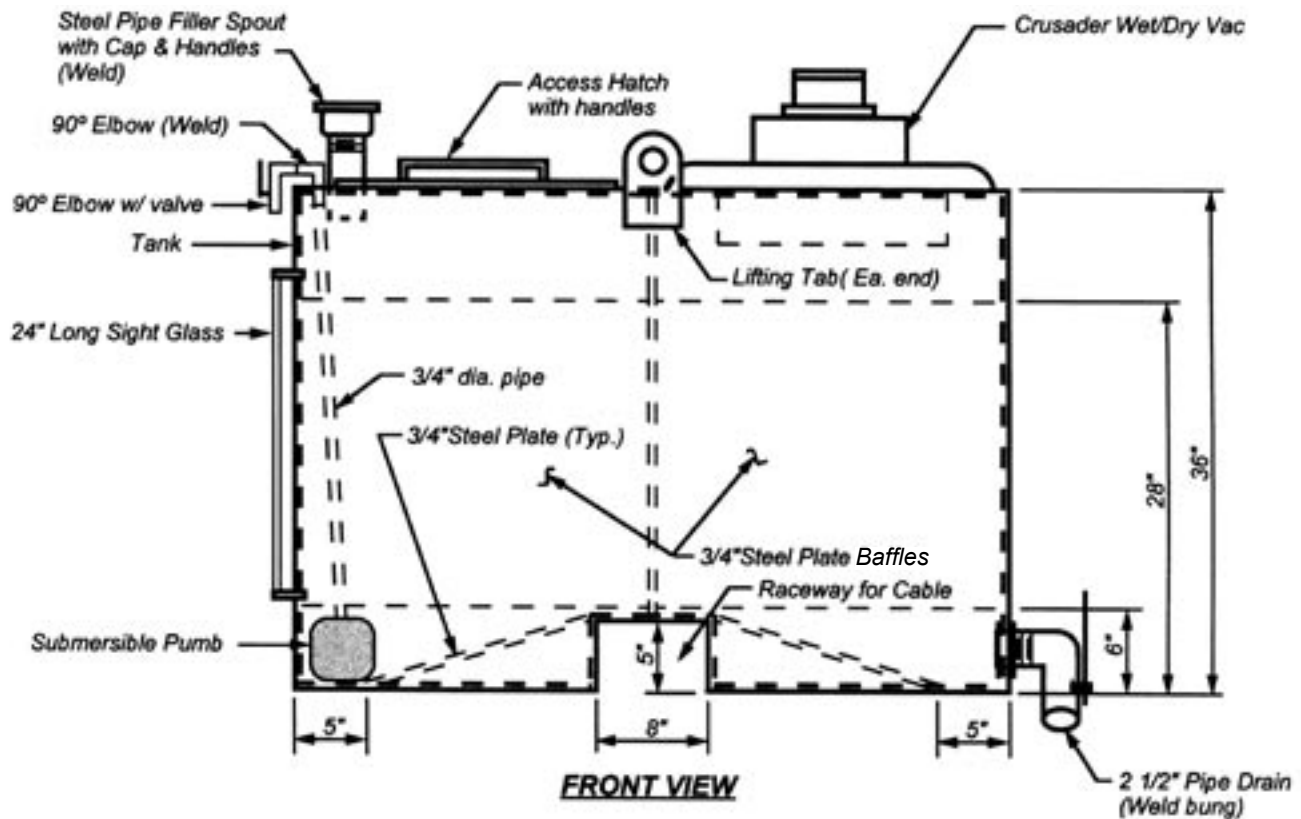
The concrete saw trailer is very efficient at recovering the wastewater used during sawing operations and keeping it out of the drainage systems found around the city of Tacoma. This reduces the environmental impact of this operation, helps protect the water quality and wildlife habitat of the area, and demonstrates to the citizens of Tacoma the good environmental stewardship practiced by the city's Public Works Department. ▲



Front view.



Winch.



Hose reel for water supply.



Hook and cable from winch for pulling the unit into place.



Saw blade rests in a notch in the deck.

WSDOT Kelso Maintenance Shop's Guardrail Bolt Puller

By Roger Chappell, WST2 Technology Integration Engineer

Have you ever had one of those tools around the maintenance yard that was designed with one purpose in mind: to make a difficult task easier? That was the purpose of the guardrail bolt puller, invented by Chon Yanez, Maintenance Tech 2; Don Avery, Mechanic; and Jeff Jackson, Mechanic of WSDOT Kelso Maintenance Shop. It solved the problem of removing 18-inch guardrail bolts from damaged guardrail. Before the guardrail bolt puller was invented, another bolt or some type of drift pin was driven into a hole from the other side of the post to remove the old bolt. With the guardrail bolt puller, you simply remove the nut from the end of the bolt, strike the end of the bolt with a sledgehammer to raise the head, and slip the puller under the head of the bolt. The slide hammer action then allows for relatively easy bolt extraction.

The guardrail bolt puller was an adaptation of a slide hammer dent puller used in auto body repairs. It took some experimentation to develop a puller head that would be strong enough to hold up to the pounding and still slide in easily behind the bolt head.

While the Kelso Maintenance crew still uses the bolt puller in some locations, they have mostly gone to the use of a cutoff saw for guardrail removal. Normally, where bent bolts are a problem, the rail is also mangled. The Maintenance crew now saw the rail and cut off the posts, removing it in larger pieces and eliminating some of the labor associated with disassembling.

If you are faced with the task of disassembling and reconstructing of existing guardrail, you might consider making a guardrail bolt puller for the job. It has proven to be a tool that saves time and effort for the WSDOT Kelso Maintenance crew. Most of the materials used in constructing the bolt puller were from odds and ends from around the Shop. With a little creativity, the cost to build one could be minimal.

Russ Smalley was the Maintenance Supervisor at the time of the development and construction of the bolt puller. From my perspective, the guardrail bolt puller is another successful team effort by the WSDOT Kelso Maintenance Shop.

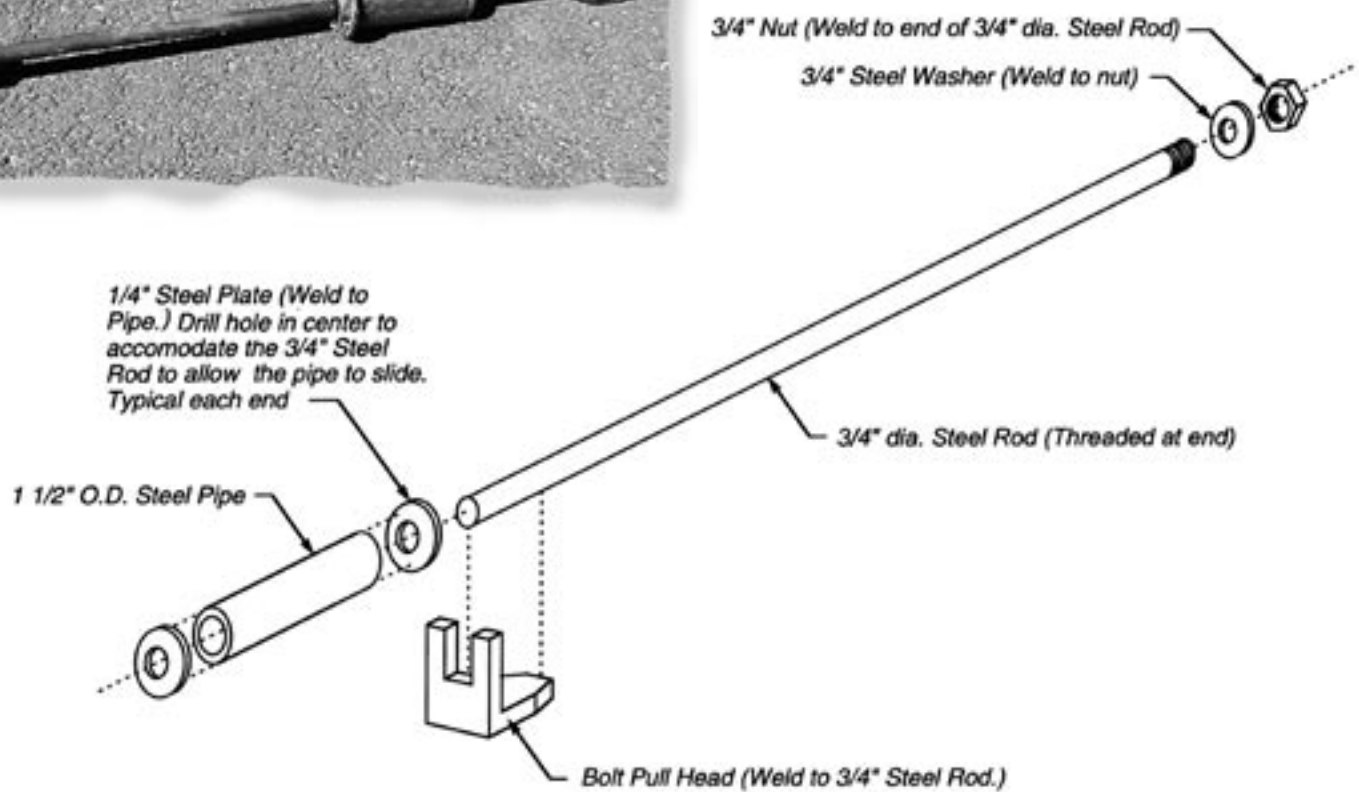
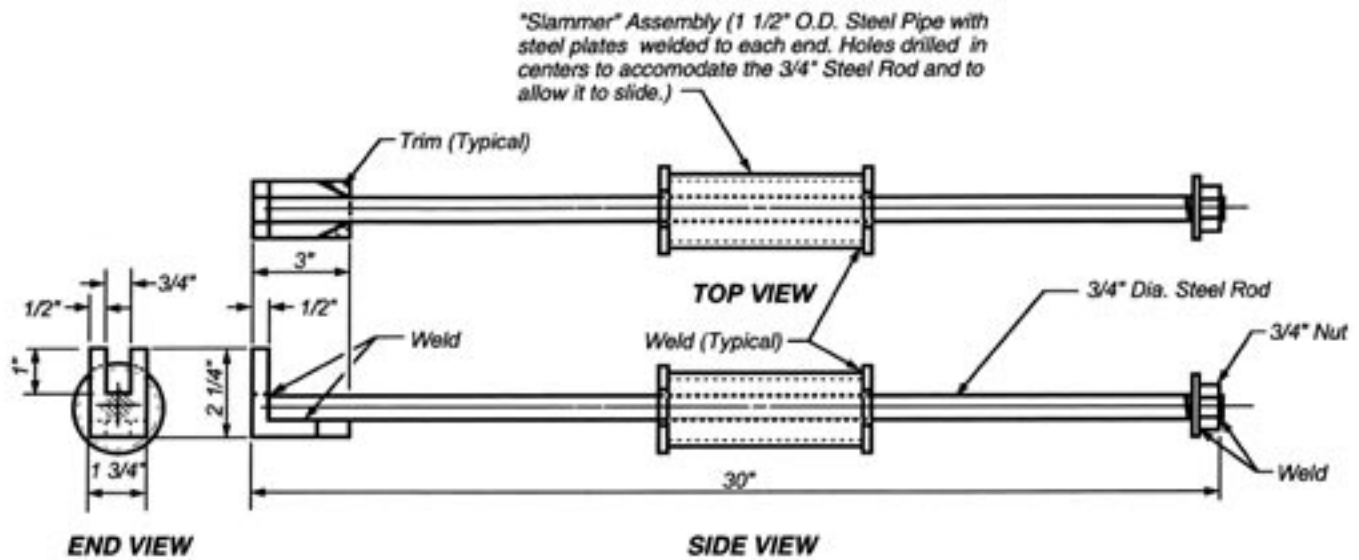


Closeup of Guardrail Bolt Puller



Guardrail Bolt Puller

For more information, contact Jim Simmons, WSDOT Kelso Maintenance, at (360) 442-1342.



GUARDRAIL BOLT PULLER

Tim Van Berkom's Asphalt Patching Grader Attachment



Tim Van Berkom stands by his Asphalt Patching Grader Attachment.

By Dave Sorensen, WST2 Traffic Technology Engineer

The Asphalt Patching Grader Attachment, designed by Tim Van Berkom from the WSDOT Shelton Maintenance Office, is used for patching trenches, potholes, and ruts. Two "boots" or blades are attached to a road grader's moldboard blade. The boots are width adjustable for patching and can also be rotated out of the way for full blade width asphalt patching. Tim had help from co-workers Aaron Corliss and Eric Hembury in building this apparatus. The first version was constructed in 1995. Since then the grader blade attachment has changed little in design. The last modifications were done in 1996.

The design of the unit is pretty straightforward. Brackets are bolted on the far left and right

backside of the grader blade. These brackets protrude slightly forward of the blade with round shoes welded to the brackets. Each end of a pipe rests in these shoes. The pipe runs horizontally at full blade width on the top front of the grader blade. The attachment blades have a collar on each one that allows them to slide over the pipe.

Picture a towel rack mounted to a wall in your bathroom with a couple of coat hangers on it that slide left and right on the towel bar, only the bar is about 12 feet wide! That's how the attachment blades are adjusted for width, by sliding them back and forth on the pipe. By using this design, the attachment blades can also be swung up and out of the way of the grader blade if full width patching is desired.

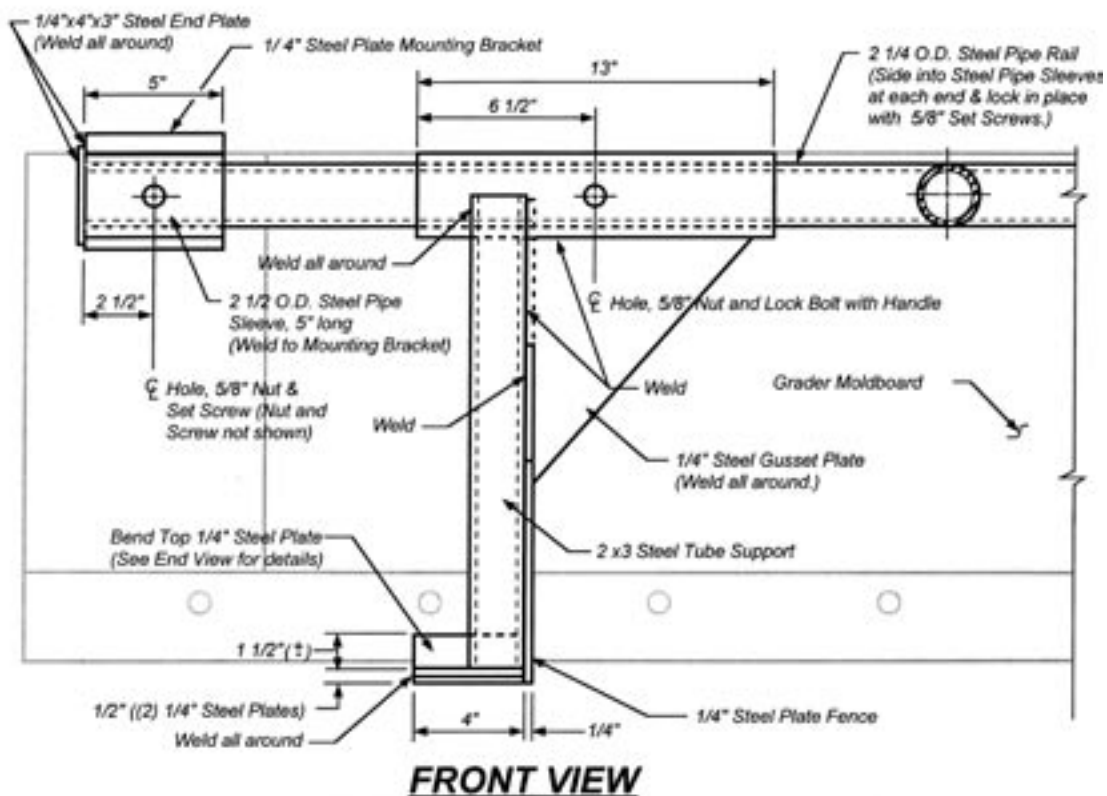
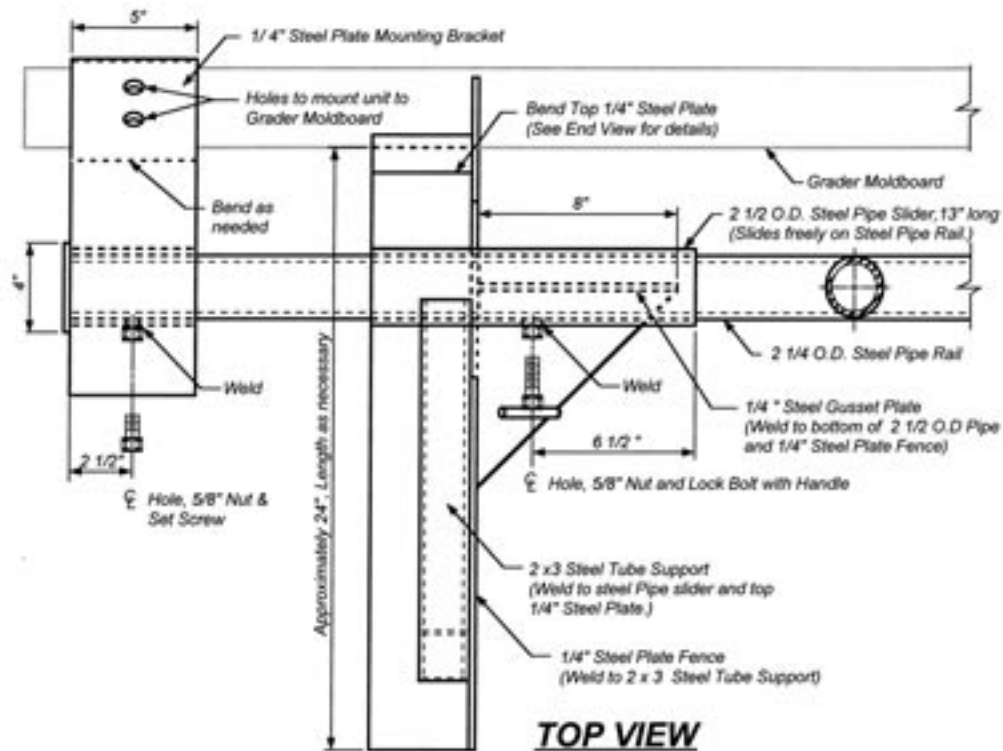
Total cost to build this invention was about \$500 with most of the material obtained from the scrap pile. The only item purchased was the pipe that the attachment blades slide back and forth on to adjust for patching width.

The greatest savings are in reducing the potential for back injuries from raking asphalt all day long. The crew size needed for this type of operation has been reduced from 5 or 6 people to 3 people. Minimal raking and shoveling of asphalt is now required.

Other benefits include smoother patches, lower labor costs, and a more efficient operation. An ACP grinder, rented from the city of Bremerton to prepare potholes, costs about \$700 a day. The old way of doing business meant the crew would spend up to two hours preparing the potholes using the grinder and then filling them with about 40 tons ACP. Using the grader attachment, the grinding operation is three times faster. The attachment saves approximately \$1,400 a day and uses approximately 120 tons of ACP.

"The best thing about this invention is the reduced potential for back injury that could end up being a life-long disability," said Larry Deemer, WSDOT Maintenance Supervisor.

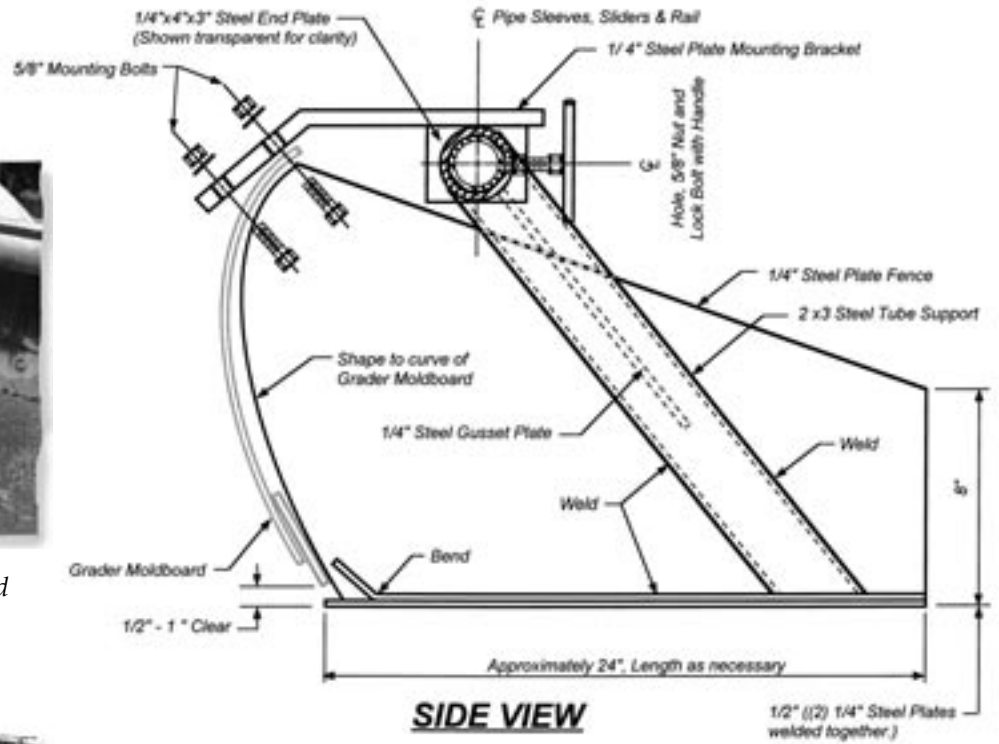
▲
For more information, contact Larry Deemer, WSDOT Shelton Maintenance Office, at (360) 427-2110



NOTE: Right Fence Unit shown. Left Fence Unit similar but reverse hand.



Left "boot" or blade slides out toward the end of the slide rail.



Right "boot" slides out on the rail for a wide patch on a paved road.



The two "boots" are width adjustable for patching.



Right "boot" rotated up and out of the way for unrestricted use of grader's moldboard.

Grant County's Enclosed Sander Heating System

By Dave Sorensen, WST2 Traffic Technology Engineer

Snow and ice control season is here once again. Keeping traffic moving safely is the primary goal of the Grant County Road District during the winter months. Snowplows are run 10 to 12 hours a day over hills and steep grades. Extreme conditions, resulting from blizzards, freezing rain and snow, and contaminated sand, develop when crews are using the sanders during low temperature operations. One of the problems encountered during these conditions is that sand in the trucks has a tendency to freeze or crust over in the sander. This can cause conveyors in the truck to plug up with frozen chunks of snow and ice.

Grant County Road District #3 employees Mike Goll and Mark Cummings, always looking for a better way to do business, came up with a solution. They invented a system using truck engine exhaust heat. This was really ingenious and simple. The exhaust is routed through the sides of the closed sander, which transfers the heat to the truck bed. Insulation was added to the sides of the truck bed and enclosed with a sheet of stainless steel. Adding the insulation keeps the heat from wicking away to the cold outside. By adding heat to the critical area around the conveyor, the amount of sand bridging is kept to a minimum.

Mike and Mark contacted the truck engine manufacturer to obtain proper exhaust backpressure and flow specifications before building the heating system. Checking with the manufacturer is recommended prior to constructing this system. Once the specifications were obtained, a 5", inside-diameter pipe was tied into the muffler outlet pipe. Then the pipe was connected to a 90-degree elbow and run vertically behind the cab to another 90-degree elbow, changing the pipe direction to horizontal. The vertical straight pipe between those 90-degree elbows is actually two pieces held together with a pipe clamp. The pipes can be disconnected to cap off the pipe from the muffler in summertime when the system is not needed.

From the second 90-degree elbow, the pipe is then connected into a "Y" pipe. This splits the exhaust stream into two pipes that run on each side of the truck the length of the sander to the back and then capped off with 4", 90-degree elbows. The last 90-degree elbow redirected the exhaust towards the ground. In this application, the pipe size was reduced from 5" to 4" after the "Y" connector. All pipe dimensions are inside diameter.

Holes were cut through the truck wall supports to accommodate the run of pipe. After the exhaust tubing was secured with bolts, Reflex insulation, which has a 97% reflectivity, was glued to the inside

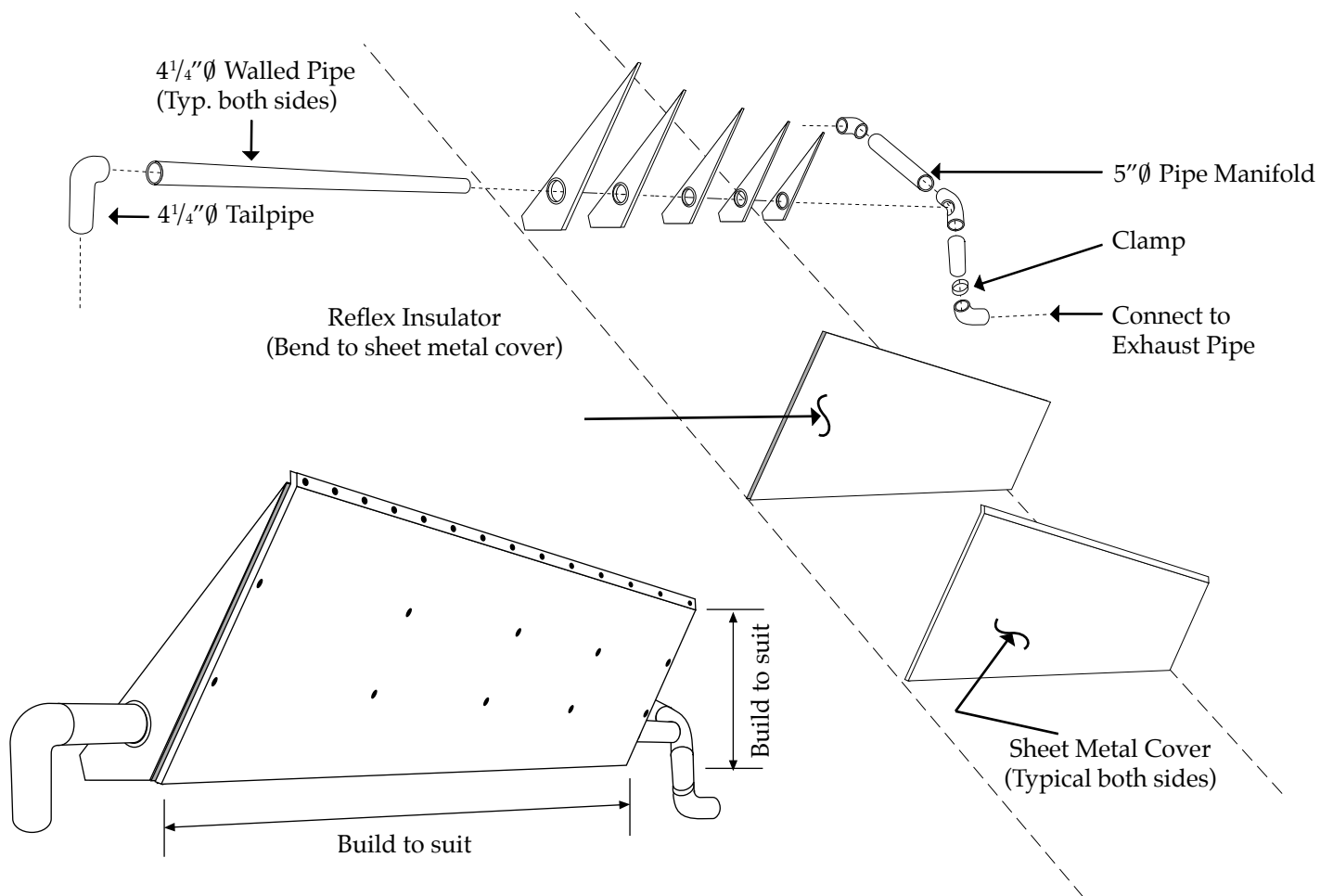
of the sheet metal using a heat resistant adhesive, thereby forcing the heat from the exhaust to the inside. All metal was then primed and painted to match.

The first version of this system worked well last winter; however, it did not have the insulation added. Early last spring the new and improved system, with added insulation, was completed, but it could not be tested thoroughly without cold winter conditions.

During testing last spring, the sander truck was loaded with sand to simulate actual operations. After the test was completed and all sand was emptied, the inside walls of the truck were left steaming hot. The crew is anxiously awaiting the first snowfall to test the new and improved design.

For more information, questions or comments, please contact Rusty Soelter, Grant County Road District #3, at (509) 787-2321.





A Better Way to Clean: Portable Sign Washer- Rinsing Pump

*By Bob Brooks, WST2 Pavement
Technology Engineer*

Dan Vest, of WSDOT's Aberdeen Maintenance Facility, and his supervisor John Hagedorn have designed and built a simple and inexpensive device for improving efficiency; the portable sign washer-rinsing pump. For less than \$100 per unit, the washer pump incorporates a 12-volt direct current (12 VDC) pump attached to a 55-gallon polyethylene drum that is loaded onto the bed of a pickup truck and powered by the truck's electrical system. The drums can be filled with either a detergent solution or a rinse water solution to greatly increase the production of the sign washing operation.

At the heart of the system is a 12-volt direct current, 10-amp, diaphragm pump manufactured by the SHURflo Pump Manufacturing Company of Cypress, California, phone (562) 795-5200, model number 2088-443-144. The pump delivers 3.5 gallons per minute at a pressure of 45 pounds per square inch. The pump comprises most of the cost of building the washer unit; the



Aberdeen crew paid about \$65 for the pump. The pump is bolted to the top of a 55-gallon drum and one-half inch diameter pneumatic tool hoses are attached to the pump fittings using hose clamps. One hose is submerged in the wash or rinse water in the drum and the other hose is attached to a squeeze nozzle that controls the flow of the water. Attaching leads to the truck's 12-volt battery or electrical system provides power.

The other major component of the washer system is the 55-gallon, Act II, tight head, high density polyethylene (HDPE) drum manufactured by the Russell-Stanley Company, phone (908) 203-9500. This is a relatively lightweight, rugged drum that's well suited to use in the washer system.

Other than the drum, pump, and hoses, the only other things needed to build the washer pump are some electrical wire, clamps for attaching to the truck's electrical system, and hose clamps. These can all be assembled in a few hours time into a working washer unit.

The Aberdeen crew places the unit in the back of a pickup truck and fills the drum with rinse water. A separate detergent solution is used for washing signs and the drum unit is used to quickly rinse the signs. This setup has allowed the crew to speed-up production and cut the overall costs associated with sign cleaning activities. At only \$100 per unit, this device can easily pay for itself in a short time. This is yet another example of the creative and innovative thinking exhibited by our WSDOT and local agency maintenance crews.

*For more information, contact
Dan Vest or John Hagedorn at
(360) 533-9447. ▲*

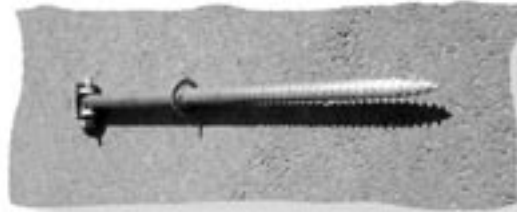


Guardrail Post Screw

*Jim Simmons, WSDOT SW Region,
Kelso-St. Helens Maintenance
Supervisor*

Through a few guardrail repair jobs, several Maintenance Techs from the WSDOT Kelso Shop had brainstorming sessions on a better way to remove broken guardrail posts from the soil. Removing broken posts consisted of digging down and around the broken stub using shovels, post hole diggers and, sometimes, hands; find enough good wood to wrap a chain around; and use a hoist, dump truck box, or the brute force of 1 or 2 people to pull the post out. Loose materials or rain and mud made this job tough and sometimes dangerous. It was never a pleasure to lie on your stomach in dirt, dig by hand, and work the chain around to get it into the wood. A series of shorter lag bolts and chains were used, but it was hard to find good wood as the posts were usually splintered or rotted. The crew decided that a very long tool that could be screwed into the ground and into the post might work. They approached Don Avery, retired Mechanic 1 from the Kelso Transportation Equipment Fund (TEF) Shop, about building a prototype giant screw. The idea was to build the screw out of thick stock to prevent bending.

The crew used 1¼" bolt stock to build the screw. T.E.F. was not set up to thread the stock so it was sent to a machine shop in Longview. The bolt head also had to be machined down to 1¼" hex



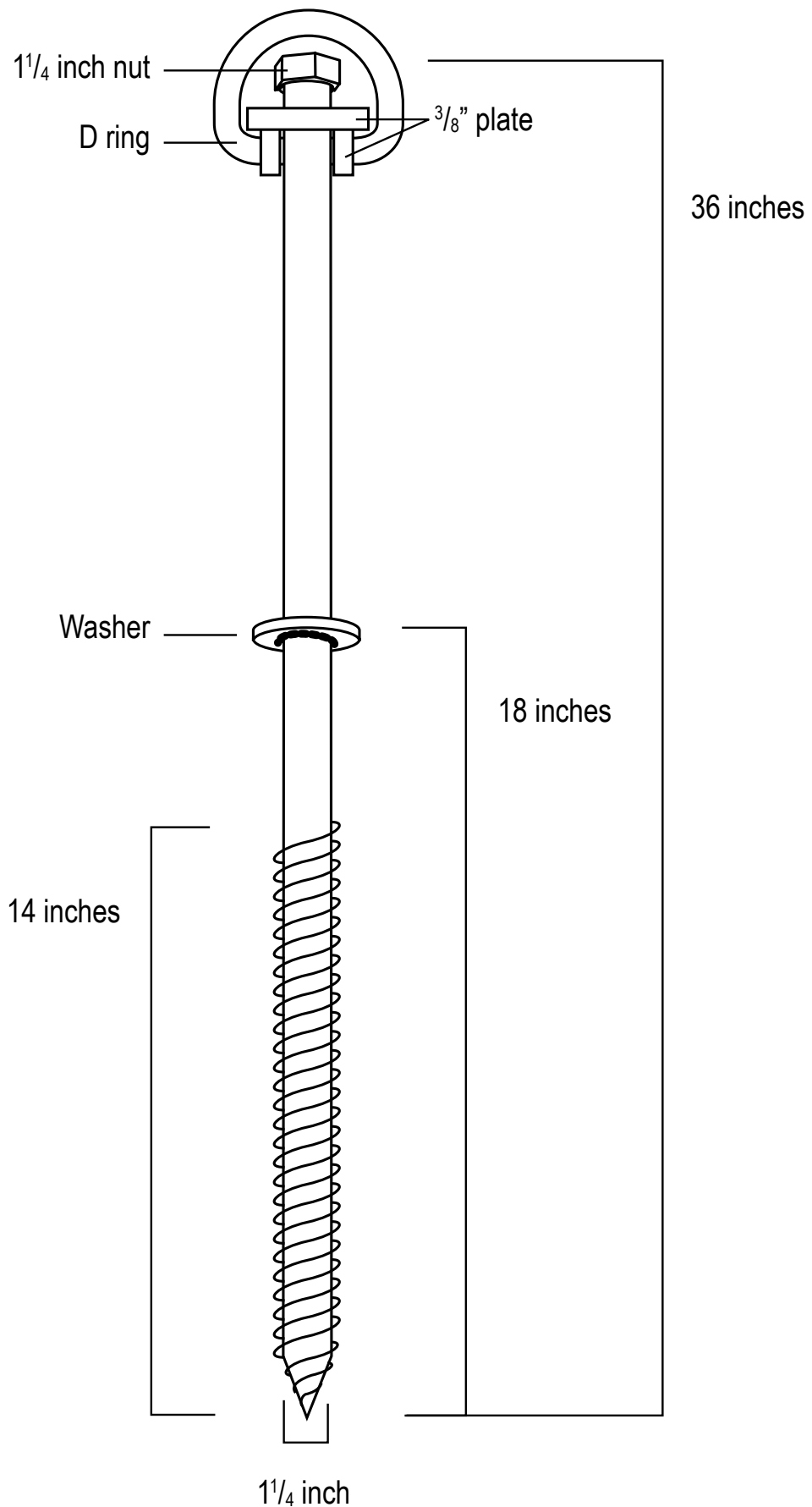
to fit the same socket used on the guardrail bolts. A piece of $\frac{3}{8}$ " plate was fitted with ears welded to it and a D-ring. This was then drilled to accommodate the shaft of the screw. A large washer was welded to the shaft of the screw to keep the lifting eye from sliding off, but enough room was allowed so that the lifting eye would not be in the way during the installation process. The air tanks on the dump trucks have fittings to plug an air hose into for supply to the air ratchet.

To remove a guardrail post, the location of the post is determined and the screw is drilled directly

into the post or into the dirt above the post until it is firmly planted into good wood. A chain is attached to the D-ring and the broken post is pulled from the ground.

While there is no good data from past jobs to verify timesavings, the crew believes that using the guardrail post screw is easier, faster, and safer than the old way of removing posts. There is less digging, no pulling and straining, no lying in the mud, etc.

The cost of the screw was between \$200.00 and \$300.00 including the cost of materials and machine shop work. ▲



Steve Potter and Mike Albright's Mobile Work Zone Traffic Control (WZTC) Cone and Sign Storage



Mike Albright, WZTC Sign & Storage Fabricator



Steve Potter, WZTC Sign & Storage Inventor

By Sharon McLeod-Everette, Alaska Technology Transfer Center, Alaska DOT (ret.). Reprinted by permission from the Alaska Exchange, Spring 2001, vol. 26, no. 1.

As Steve Potter, equipment operator for Alaska Dept. of Transportation and Public Facilities', Northern Region Maintenance & Operations in Fairbanks, watched workers set out and pick up cones and signs for mobile work zone traffic control, he noticed a few things. First, there was no place to efficiently store cones, signs, and sign stands - they got jumbled up in the bed of a pickup. It was awkward for workers to lift the heavy signs and stands over the side of the bed to place the signs, and the same was true for

replacing the signs. Cones would get stacked together and then signs and stands would fall over on them. Second, people had a tendency to throw trash into the bed of the pickup. It was messy. Potter saw a need for a better way to handle the cones and signs and penned a conceptual drawing.

Mike Albright, another Fairbanks operator, took Potter's concept drawing and went to work. He built storage components into the flatbed of the truck specifically to accommodate setting out and picking up cones, signs, and stands. By putting their heads together, Potter and Albright developed a safer and more efficient means for their traffic control workers to deal with cones and signs. Clutter no longer

builds up in the bed of the pickup because the flatbed is, in a word, flat. The flatbed has no sides, so there's no lifting over the side to dump the signs, etc. into the bed or to get them out.

The bed is aluminum and is customized for specific work zone items. The stand holders and sign racks are steel. Albright produced raised pinnacles to stack cones, recessed containers for sign stands, and created racks for the signs. Potter and Albright put these components on a truck that can also be used as a pilot car. It has cautionary lights on a headache rack just behind the cab. Material costs for the aluminum and steel run about \$1,500, according to Albright. Alaska DOT Northern Region is now building its third WZTC truck.



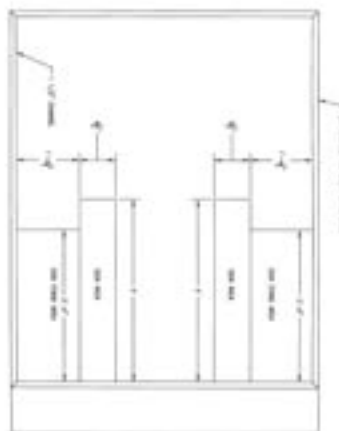
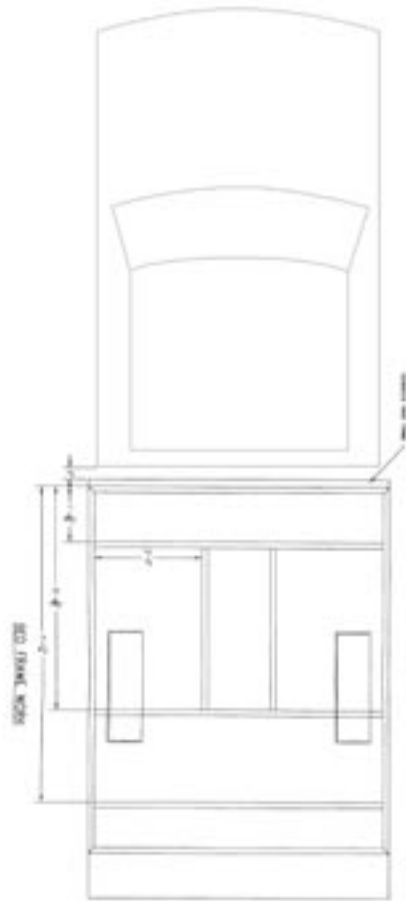
WZTC Truck Sign Stand Storage

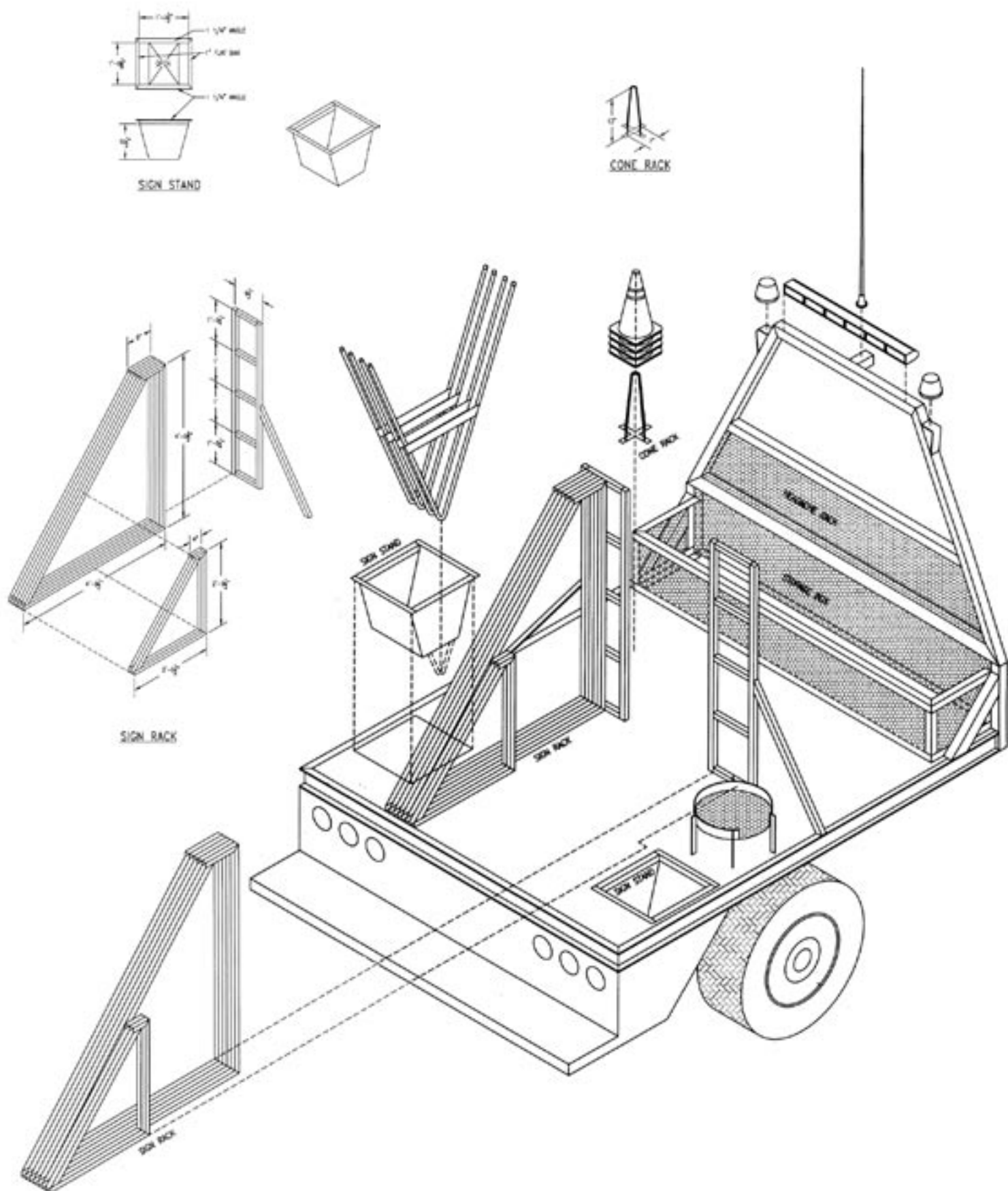


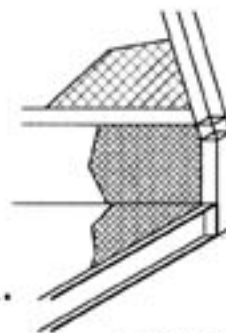
WZTC Truck Cone Storage

Potter, who was nominated by his supervisor, recently received an AASHTO award for recognizing the need for a safer, more efficient way to deal with traffic control tools and then using his can-do ability to conceptualize the drawing. Albright deserves kudos as well for manufacturing the truck.

For a copy of the drawing and specs, contact Steve or Mike at (907) 451-2205 or email Alaska DOT Fairbanks Area Manager, at david_zwaldo@dot.state.ak.us





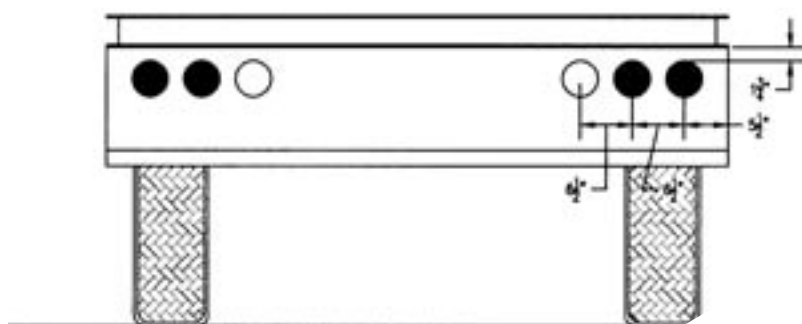
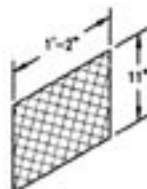
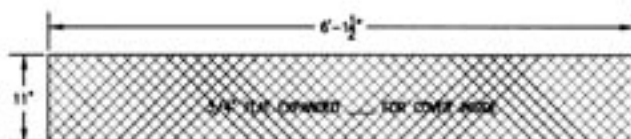


HEADACHE RACK

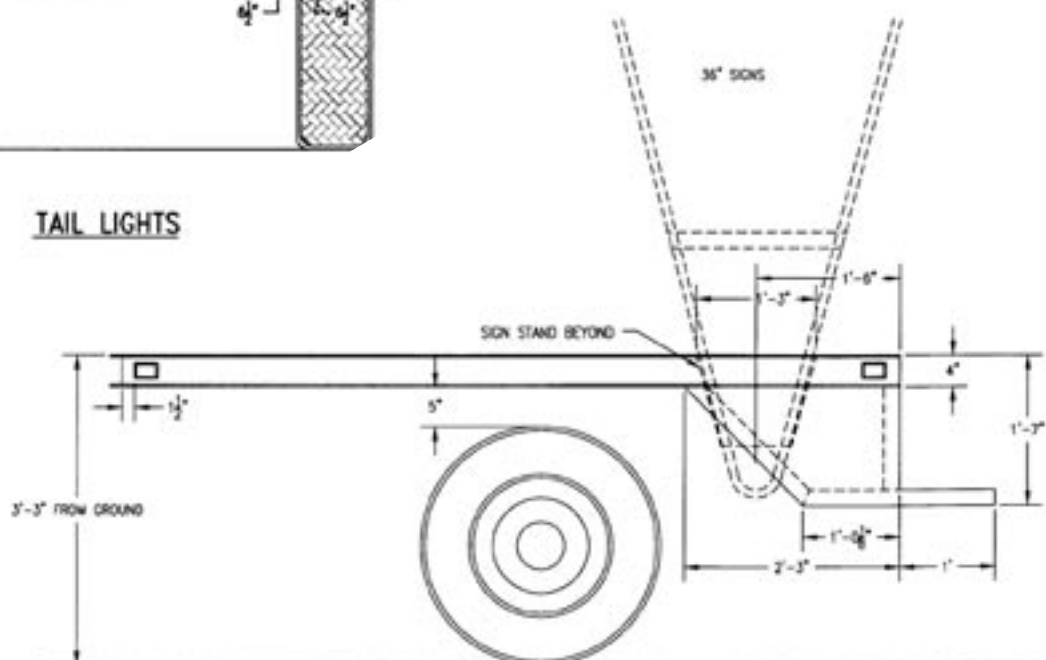


STORAGE BOX

• 2 PIECES 1 $\frac{1}{2}$ " FLAT



TAIL LIGHTS



ELEVATION

Jack Moltz's Under Guardrail Cleaner



*By Dave Sorensen,
WST2 Traffic Technology Engineer*

Highway maintenance operations take a lot of time and effort, and often can be hazardous duty. Cleaning under guardrails is no exception. Removal of roadside debris comes with exposure to traffic. Closing a lane on already overcrowded highway sets the stage for rear end collisions, impeding the traffic stream, and air quality degradation.

Because Jack Moltz, WSDOT Chehalis Maintenance, is always looking for a "Better Mousetrap" and safer ways to do his work, he developed the under guardrail cleaner. Jack took his idea to Bob Steel of the Transportation Equipment Fund (TEF) shop who fabricated the tool. Daryl Sprague, also from WSDOT Chehalis Maintenance, had the pleasure of operating the mini excavator with the tool attachment for a trial run. "We were impressed," Jack said.

With the old hand shovel method, a crew of eight could cover about 1000 feet a day and that required a lane closure on I-5 at night. The section of I-5 Jack and crew work on has only two lanes in each direction so a lane closure can back up traffic quickly.

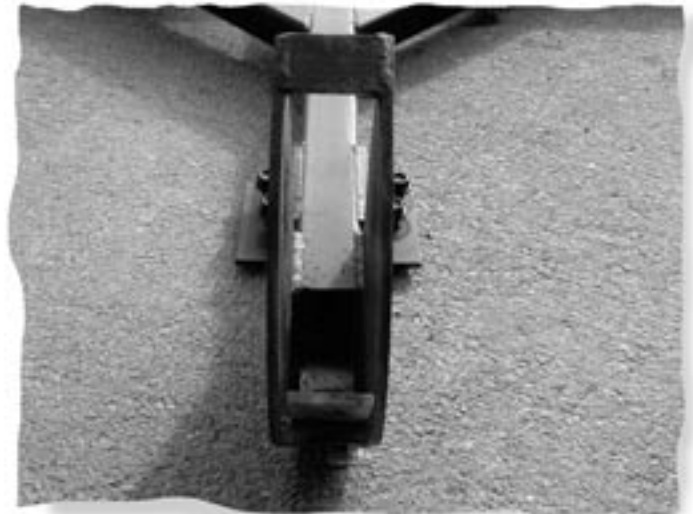
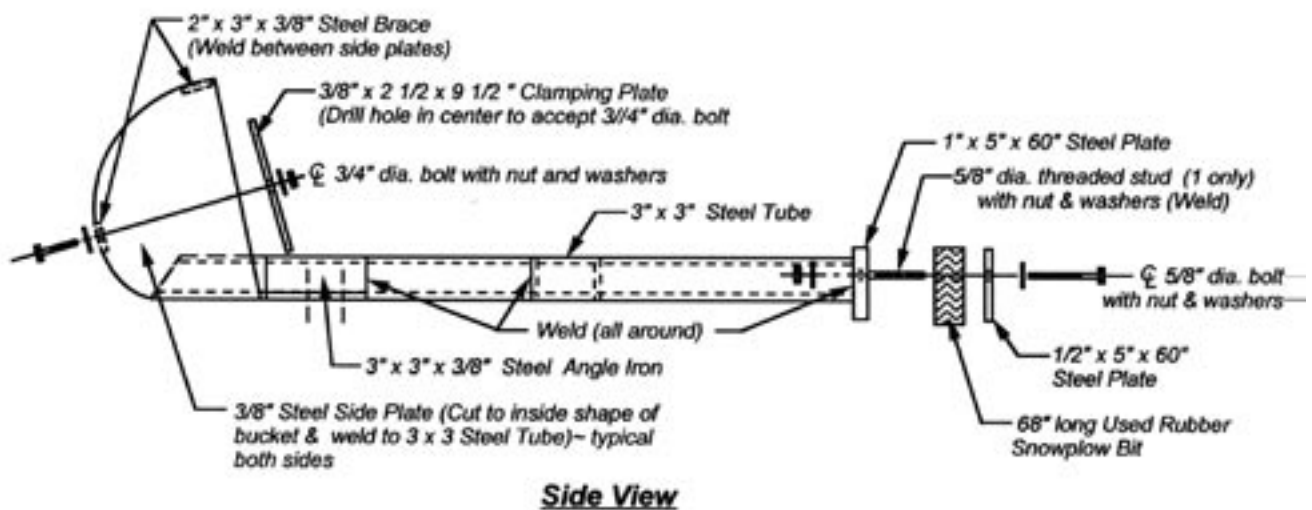
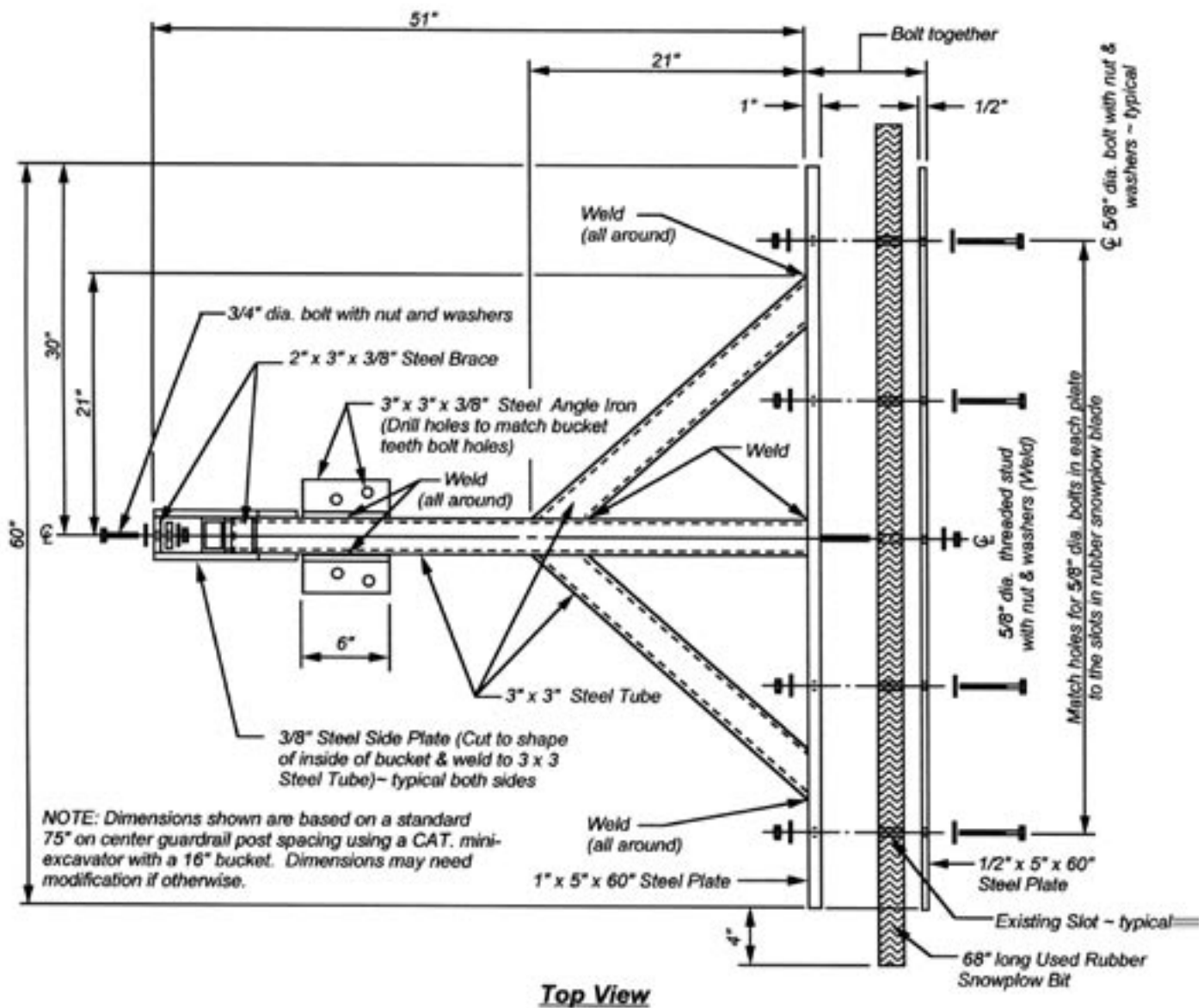


Photo top left: Jack Moltz and his Under-Guardrail Cleaner.

Photo top right: Cat Mini-excavator with a 16" bucket.

Photo above: The connection fits inside the excavator bucket and is bolted through existing holes for the bucket teeth and another in the back of the bucket.



Using this new tool, a 3-member crew can accomplish over a mile with only a shoulder closure during the daytime operations. The savings really adds up in reduced labor, equipment, societal cost of traffic delays and enhanced employee safety. The tool also extends the useful life of snowplow bits with another function. The tool was inexpensive, costing about three hundred dollars to build. "This has proven to make the job very easy and fast. It has saved time and money," Moltz said.

For more information, questions or comments, please contact Jack Moltz, WSDOT Chehalis Maintenance, at (360) 748-2181. ▲



Photo top right: Bolt locations match existing holes in the bucket for mounting teeth.

Photo middle left: A worn out rubber snowplow blade is sandwiched between 2 steel plates.

Photo middle right: The width of the unit allows raking between the guardrail posts in one pass.

Photo to left: The under-guardrail cleaner is simple to build and very effective.



WSDOT Aberdeen Maintenance Shop's Culvert Cleaning and Relining Process



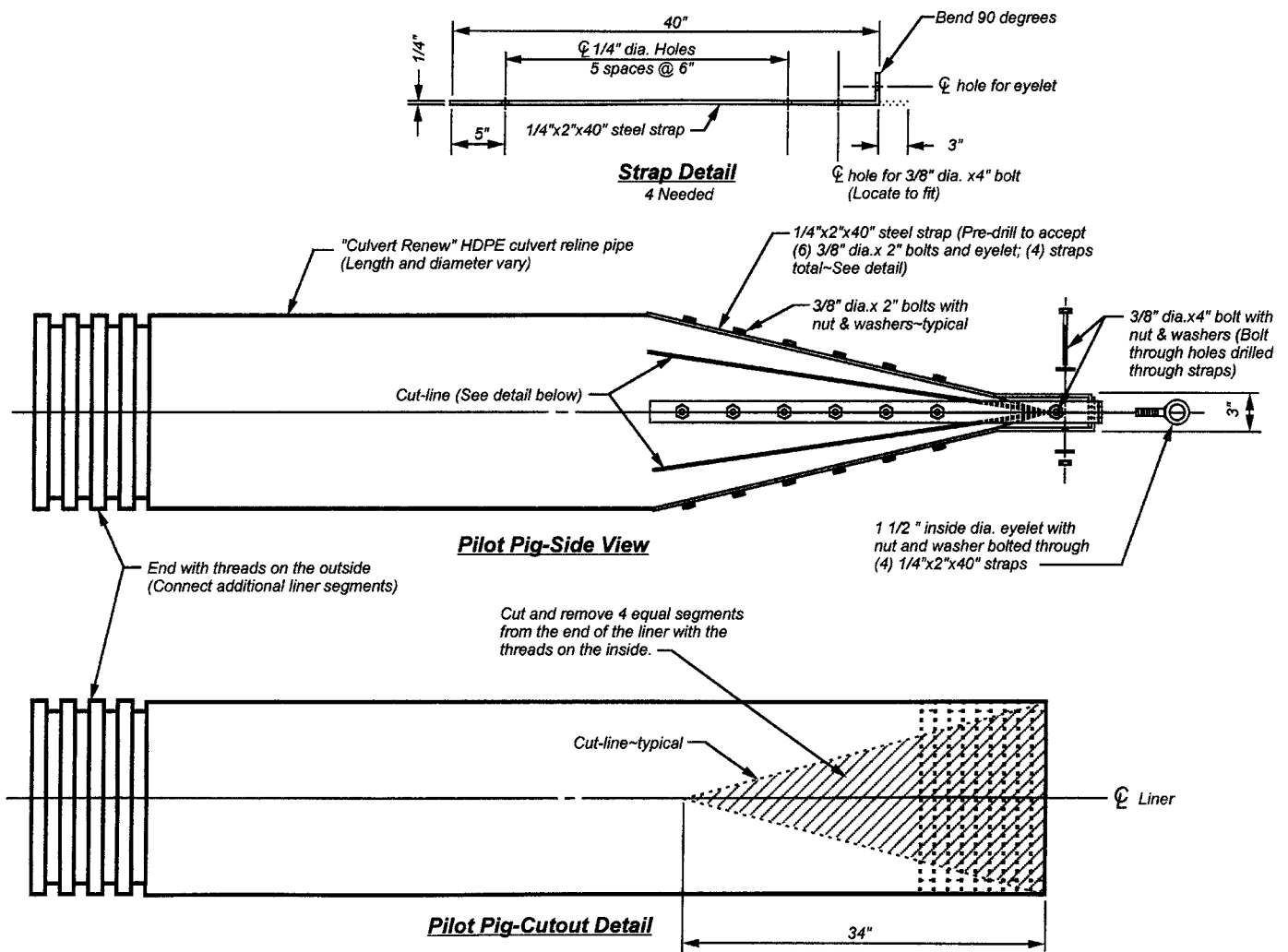
"Don Wright, Gregg Schmitz, and Ernie Shumate (left to right) display their culvert cleaning pig"

The Story of the Three Little "Pigs"

*By Bob Brooks, WST2 Pavement
Technology Engineer*

Several crewmembers from the Washington State Department of Transportation's (WSDOT) Aberdeen Maintenance Office in the Olympic Region have devised a very effective method for cleaning and relining culvert pipes. The cleaning "pigs" can be used independently as a cleaning tool or in preparation for the relining process. The crew has repaired several 24-inch culverts with scour damage using this process.

Supervisor Ernie Shumate, Lead Tech Keith Teeter and Crewmembers Gregg Schmitz, Don Wright, Randy Moody, and Joe Shapansky developed the idea for the cleaning "pigs". They built the devices in about four hours for very little cost using scrap material they had on-hand. The cleaning "pigs" are actually two separate tools used together to accomplish the culvert cleaning.

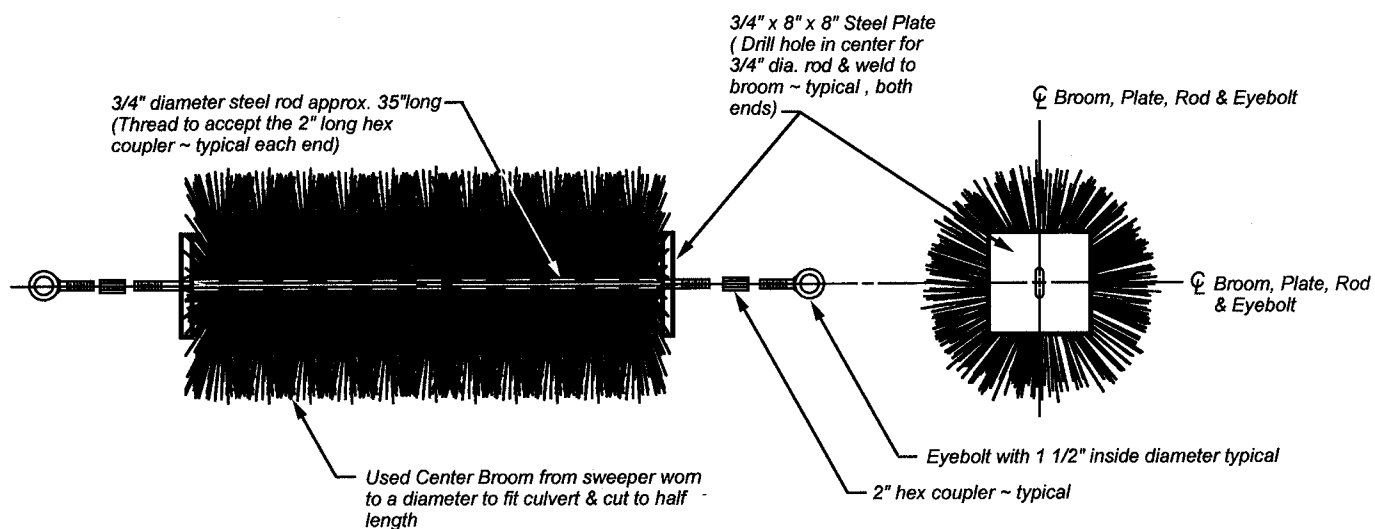


The First Cleaning "Pig"

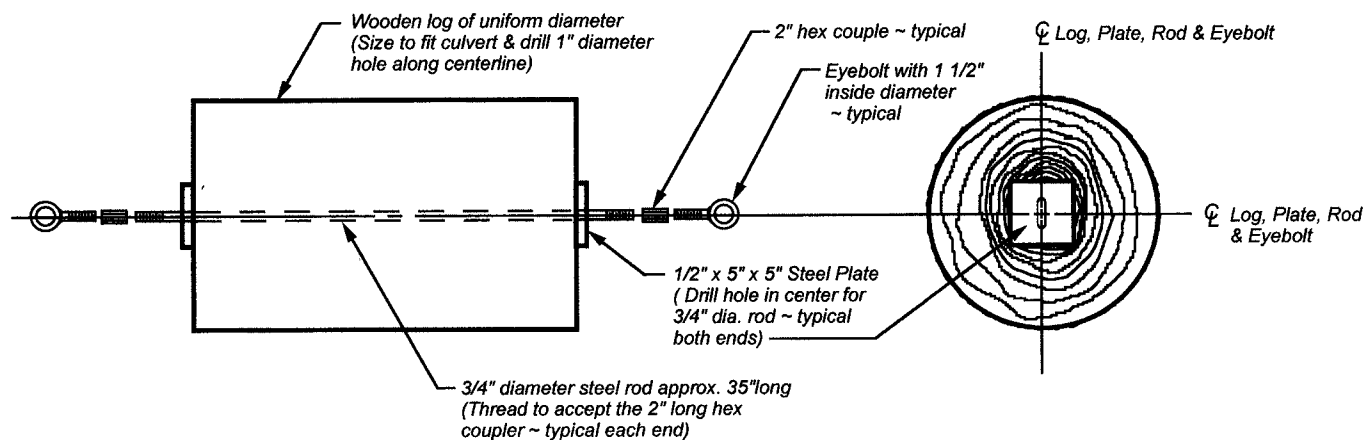
The first cleaning "pig" was fashioned from the center broom of a pick-up sweeper. The broom is allowed to wear down to an appropriate size for the intended culvert to be cleaned; for the 24" culverts the broom was allowed to wear to approximately 21" - 22" in diameter. The broom was then removed from the sweeper and cut in half to create a handy, workable length of around 31". Quarter-inch steel plates, with holes sized to pass a 3/4" rod through the center, were then welded to each end of the broom. A 3/4" diameter threaded rod was then inserted through the broom and plates, a threaded coupler was attached to both ends of the rod, and eyelets were attached to each of the couplers.



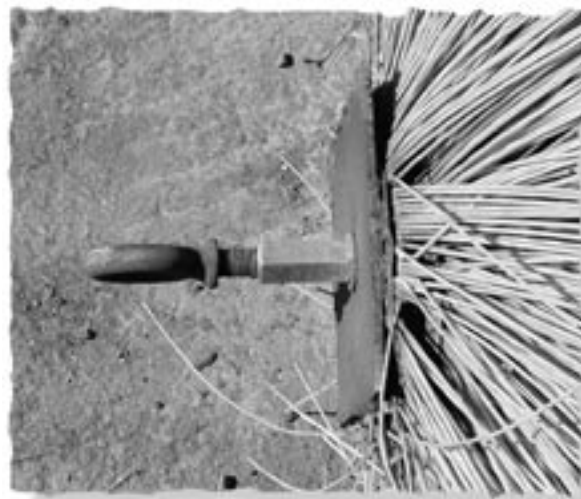
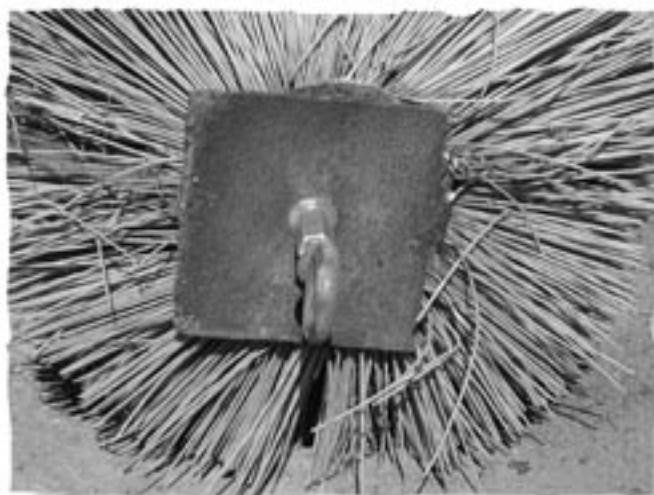
"Center Broom From Sweeper - Culvert Cleaning Pig"



Cleaning Pig #1



Cleaning Pig #2



"Center Broom From Sweeper - Culvert Cleaning Pig"



"Wooden Culvert Cleaning Pig"

The Second Cleaning "Pig"

The second cleaning "pig" was made from a 24" section cut from a tree with a uniform diameter to fit the diameter of the culvert to be cleaned. For the 24" diameter culverts, the pig diameter was again approximately 21" - 22". As with the broom, the wooden log section was drilled, a $\frac{3}{4}$ " diameter threaded rod was inserted through the center, and eyelets were attached to the ends of the rod.

The Cleaning Process

To accomplish the culvert cleaning, a steel cable is threaded through the culvert using a series of metal plumbing pipes screwed together. An excavator and wood block are used as an anchor point and the cable is drawn around the block and attached to a pickup truck. This setup allows for a straight pull of the cable through the culvert pipe. The broom is then attached to the other end of the cable. Another steel cable is attached to the opposite end of the broom to allow the "pig" to be pulled back out if it gets stuck inside the culvert. The pickup then draws the broom through the culvert.

By starting the cleaning process using the broom, the bigger pieces of debris are removed first. Next, this same process is repeated using the wooden "pig" which completes the cleaning process and prepares the culvert for relining if needed.



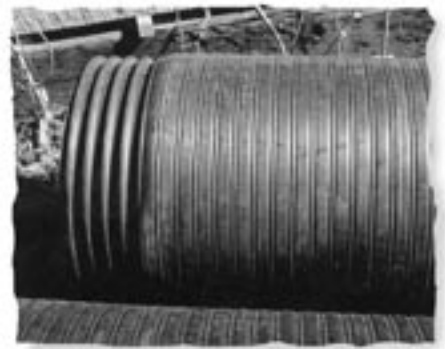
"'Culvert Renew' Modified Culvert Relining System"

The Relining Process

The relining process involves pulling a pilot "pig" through the culvert in a similar manner as the cleaning "pigs" and connecting additional sections of liner as needed. Once the pilot "pig" has towed the complete liner into place, it is disconnected and reused.

The relining process utilizes a very specialized culvert pipe called "Culvert Renew" manufactured by Poly Profiles Technology, Inc., Missouri. This pipe is designed specifically for culvert relining and comes in various diameters common to culverts and in lengths of 5, 10, and 20 feet. Each section of the smooth bore, high-density, polyethylene pipe is manufactured with threaded male and female ends that allow the sections to attach to form a contiguous section for the relining process.

What the Aberdeen crew did was design a pilot by modifying a section of the standard pipe. They took a section of this pipe and divided the female end into equal quadrants. Each quadrant was cut back to a single point about 34" into the pipe in a triangular shape



and removed. A steel strap measuring $\frac{1}{4}$ "x2"x40" was then bolted onto each of the four remaining triangular pieces of pipe in line with the centerline of the pipe. The straps were bent 90 degrees 3" from the end so that they overlapped to form a square approximately 3"x3" when they came together at the end. An eyelet with a $1\frac{1}{2}$ " inside diameter was then bolted through a hole in the straps where the four straps overlapped.

As with the cleaning pigs, a steel cable is attached to the eyelet and the modified "Culvert Renew" pipe is then drawn into the culvert to be relined. When needed, an additional relining pipe segment is screwed onto the first segment and then drawn further into the culvert. This process is repeated until enough length has been towed into place to fully reline the existing culvert pipe. When sufficient length is in place, the cable and first pilot pipe segment are removed. The remaining ends of the new liner can then be beveled as needed to fit the existing culvert profile.

The "Culvert Renew" pipe, sized to reline a 24" culvert costs about \$480 per 20' length, \$270 per 10' length, and \$150 per 5' length. While this might seem expensive, this has proven to be an effective system that allows the maintenance crew to clean and reline a culvert, a process that would have previously required a contract to accomplish. ▲

WSDOT Aberdeen Maintenance Shop's Chip Seal Hitch

*By Wendy Schmidt, WST2
Assistant Editor*

Well, isn't this just the way things go? You get a system down and things are running smoothly, then something changes and you are back to square one. That's what happened at the WSDOT Olympic Region shop in Aberdeen. They had been using hitches built by equipment mechanic Jerry Shields on all of their dump trucks that enabled their chip seal operation to proceed swiftly. Then about a year ago, they purchased new trucks and acquired a different chip spreader box. Some of the old hitches were welded to their older trucks, so when the trucks went, so did the hitches. The remaining hitches didn't fit the new trucks. The hitches were handy because they allowed the chip spreader to latch onto a bar on the back of the truck for quick grab and release. Don Wright, Lead Tech, crawled around under the new trucks looking for a place to attach a chip spreader hitch onto their new trucks. The trucks were a little different from each other, and Don noticed the only thing that was the same on all of them was the pintle hitch mount, or coupler, bolted

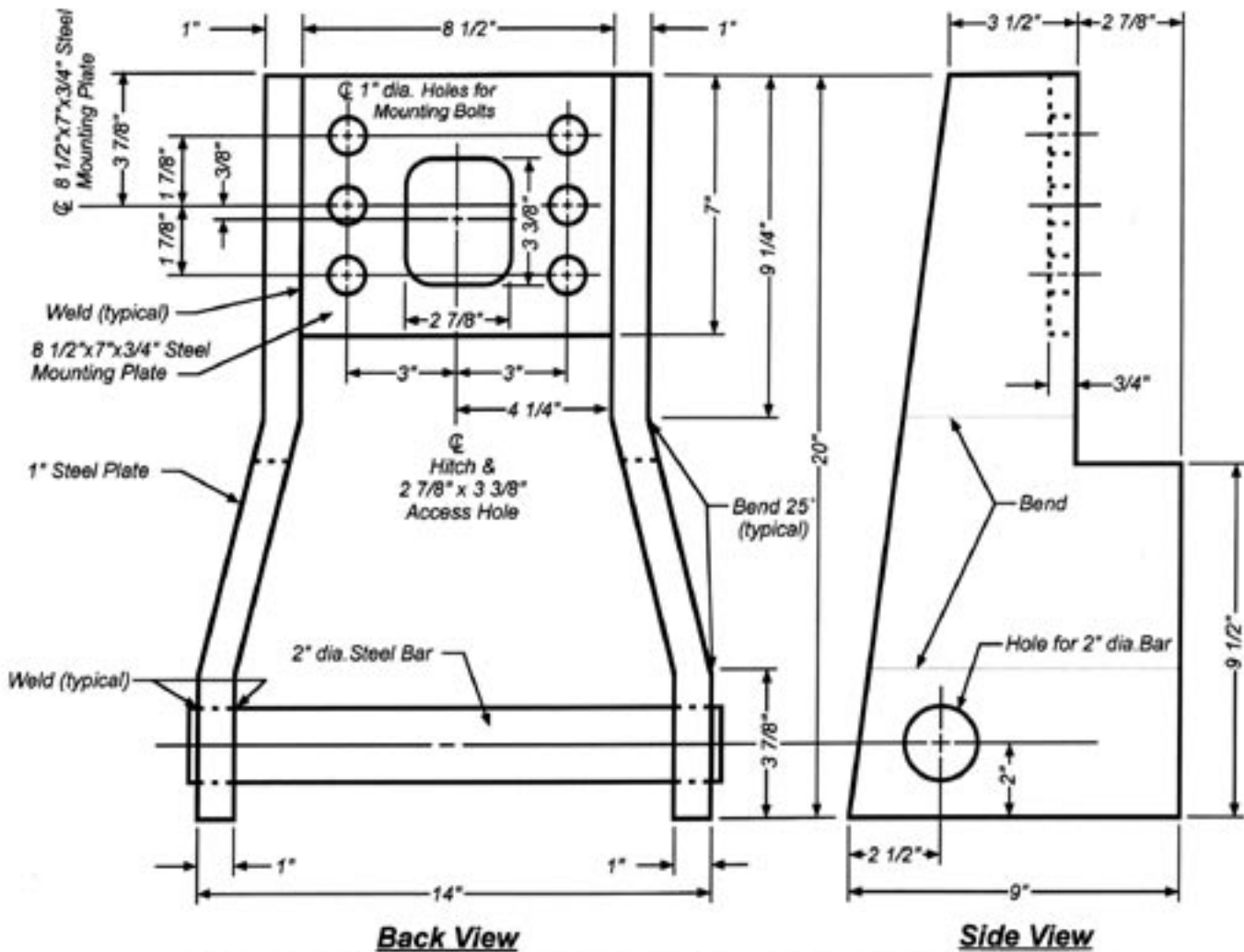
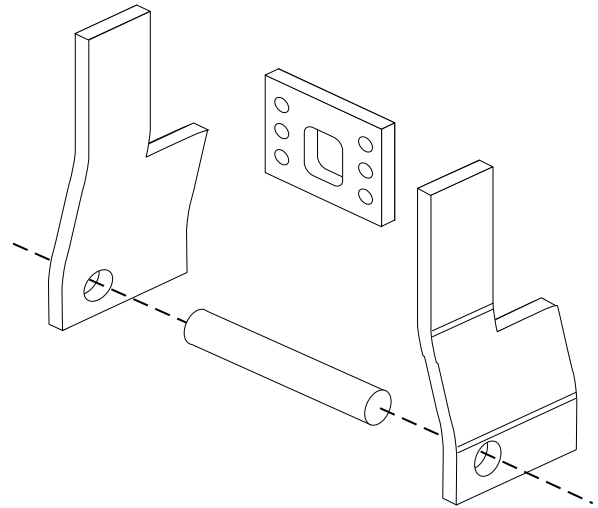
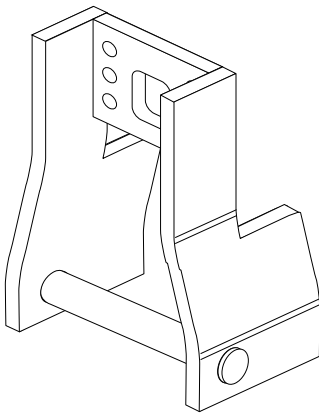
to the rear bulkhead. He came up with the idea of making the hitch so a back plate could be sandwiched between the coupler and the bulkhead and bolted on.

Don sketched a hitch resembling a manufactured one he had seen, modified it so it would work with their spreader box, and took it to a local machine shop. The shop fabricated one, but Don and his co-workers found they had to modify it because the hitch bar on some trucks was too far under the truck. When the spreader box fastened onto the hitch, it was set too close to the truck, so they didn't turn around a curve very well together. Don and his co-workers also discovered that some of the holes drilled through the back plate didn't quite match up with the holes through the coupler plate and the rear bulkhead on the trucks. To solve that, they drilled the holes a little larger. It was also necessary to extend the length of the coupling thimble between the air can and the coupling by the thickness of the back plate on their new hitch, $\frac{3}{4}$ inch. They discovered if they installed a $3\frac{1}{2}$ " long thimble in place of standard $2\frac{3}{4}$ " standard thimble, everything worked OK.

They used $\frac{3}{4}$ " diameter bolts to fasten both the coupler and the spreader box hitch to the rear bulkhead of each truck. The holes were slightly oversized to 1-inch diameter to allow proper alignment of all three components.

Once they had a working design, they made more. Jerry Shields and Don Soto, also an Equipment Mechanic¹ at the WSDOT Aberdeen Equipment Shop, modified and mounted seven new hitches on their trucks, all with encouragement from Les Nevitt, Equipment Mechanic 2, their Supervisor. Ron Bashon, Area 4 Maintenance Superintendent, and Jim Green, Olympic Region Equipment Superintendent, both supported the construction of the new devices as tools that would make their district's chip seal operations run smoother, faster, and safer. With these hitches, trucks can "hook on the fly" so the chip spreader box doesn't have to stop when one truck dismounts and the next truck backs in and hooks up.

For more information, you can contact the WSDOT Aberdeen Maintenance Office by telephone at (360) 533-9356. ▲



NOTE: Adjust the dimensions of the mounting bolt and access holes to fit the coupler being used. Hole dimensions and locations shown are for a Model 370 Coupling from Premier Manufacturing Co.. Also, the coupler "Thimble" will need to be replaced with one 3/4" longer than the original to account for the thickness of the mounting plate.

Bobcat Grinder Asphalt Screed

*By Roger Chappell, WST2
Technology Integration Engineer,
WST2 Center*

How do you get smoother asphalt without spending a lot of time and money? Well, if you're Brian Gibb, Jeff Jackson, Jim Simmons and six other members of the WSDOT Kelso Maintenance Crew, you develop and build the Asphalt Screed.

By using the screed, they are able to complete the same job in half the time and save money in the process. Before the asphalt screed, you either had to hand rake or use a grader to spread the asphalt after a grinding operation. Hand raking was time and labor intensive and using a blade was expensive; neither was very consistent. The asphalt screed eliminates the need for a grader and operator or two people manually raking the asphalt. By using this new tool, the Kelso Maintenance Crew has found a net savings of approximately \$415 for a 10-hour day.

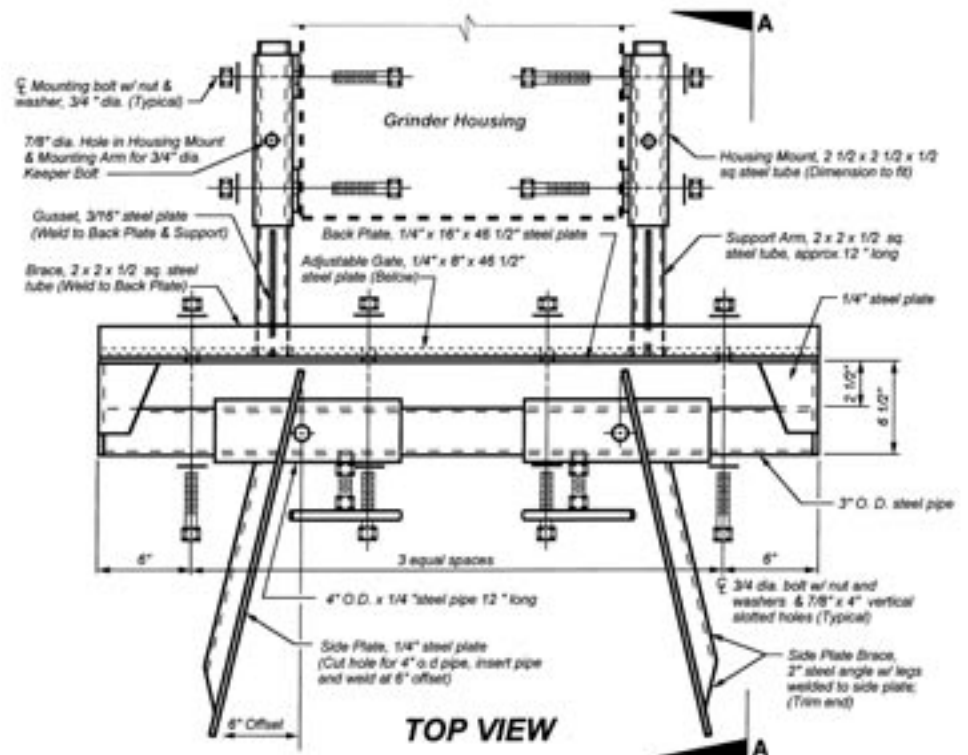
You are probably wondering what it costs to build an asphalt screed? The prototype unit cost approximately \$500 to develop. The Crew is now able to build one for approximately \$300, depending on the availability of recyclable materials. The welding and fabrication



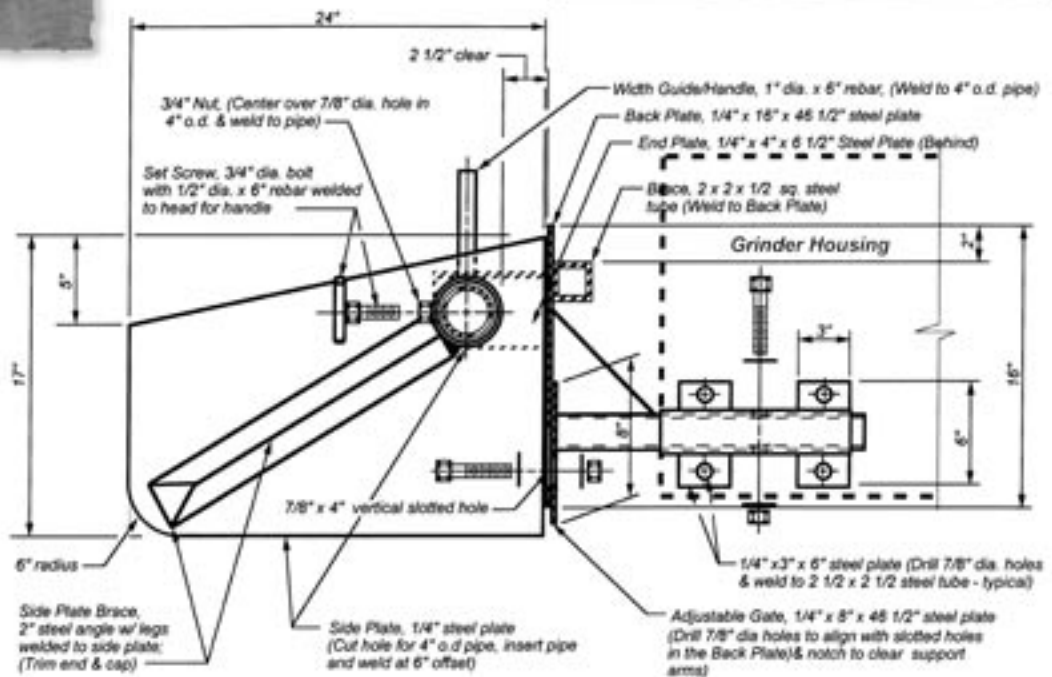
was done in-house. As with most inventions, developing and building the asphalt screed has been an evolutionary process. Incremental improvements continue to be made as crews find ways to adapt the tool to meet various needs. Using the handles on top of the asphalt screed for sighting, size, angle of the blades, and bracing has all gone through this evolutionary process.

How does it work? The asphalt screed was designed so that the adjustable mounts are bolted onto the asphalt grinder housing.

Mountings are designed in such a way as to keep the screed up and out of the way during grinding operations. After grinding operation is complete, asphalt is placed in the trench. The grinder is then tilted forward lowering the screed to the pavement. As the screed moves forward, it is designed to gather the asphalt to the center, leaving the edges clean, and the height is set so it is ready for rolling. A simple yet effective solution to an expensive labor-intensive process. ▲



Note: Mount the unit onto the Grinder Housing so that the Grinder Head doesn't contact the new asphalt during screeding operations.



Dave Nuttman's Temporary Sign Support for Jersey Barriers

*By Dan Sunde, Former
Director, WST2 Center*

What do you do when you don't have enough room on the shoulder adjacent to a Jersey Barrier to place temporary signing? Dave Nuttman, Bridge Tech II, WSDOT Southwest Region has come up with a handy solution. Dave has developed a portable sign base that slips into the joint between two adjacent barrier sections.

The sign base is compact, sturdy and easy to build. It is constructed of four simple pieces, two support legs (20" long pieces of 1½" x 1½" steel angles), a top plate (a 6½" section of 3" x 3" steel angle) and a sign connection (a 4" long piece of 1½" x 1½" steel tube). The 1½" x 1½" steel angles are welded to the vertical leg of the 3" x 3" steel angle top plate at angles parallel to the face of the barrier and with one leg parallel to the face of the joint. The 3" x 3" steel angle top plate sits across the top of the Jersey Barrier with one leg of the angle laying flat across the top of the barrier and the other leg vertical. A 4" long 1½" x 1½" is welded vertically, centered on the 3" x 3" angle and flush to the vertical leg.

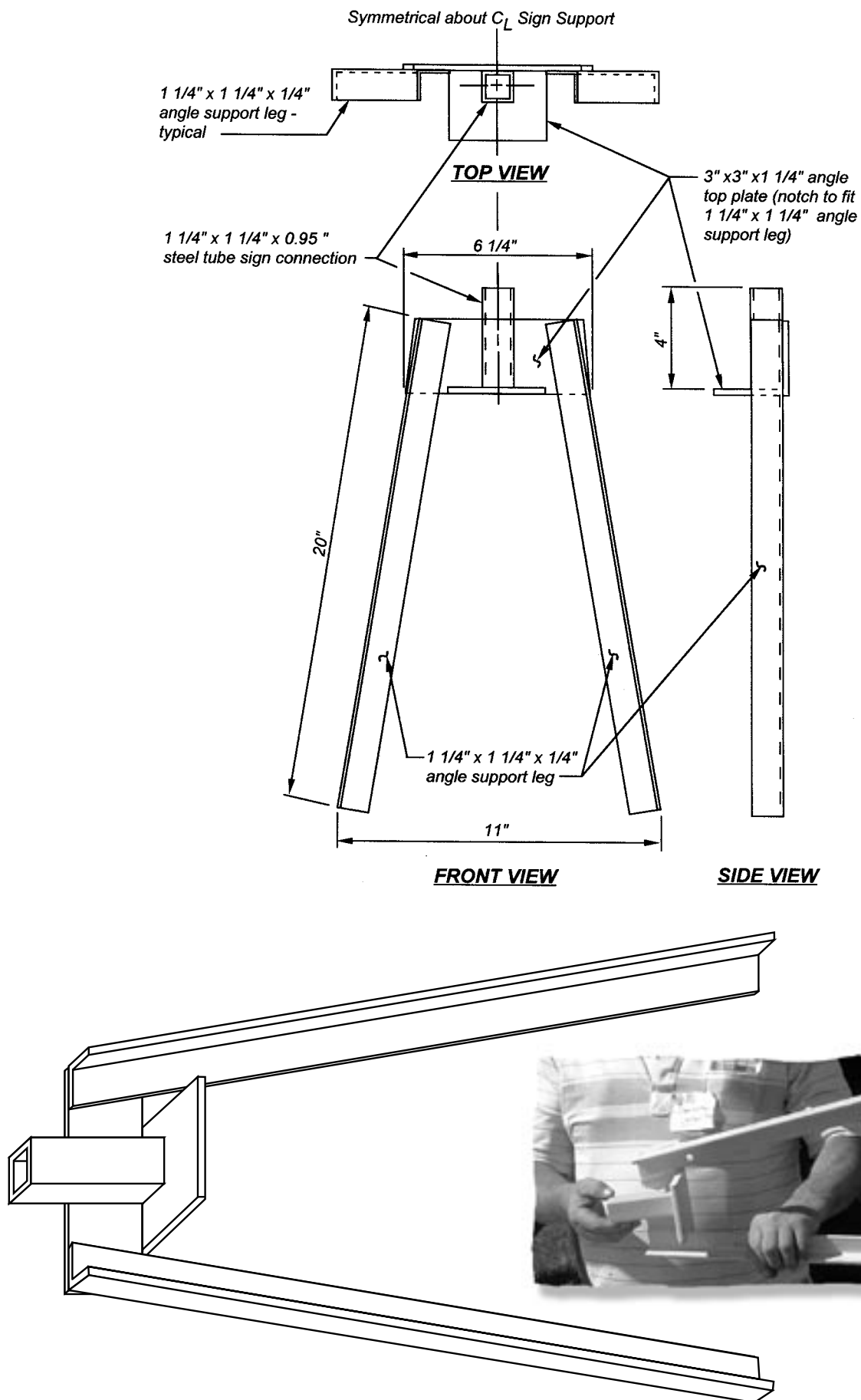
Using the support is simple. The legs of the 20" long pieces of 1½" x 1½" steel angles are slipped into the joint between two sections of the Jersey Barrier with the bottom of the 3" x 3" angle resting on the

top of the barrier. A sign is then slipped onto the 4" long tube.

Dave says the support works "very well." The legs are well anchored into the joint providing the

necessary support to resist turning over and are easy to remove when done. The region has fabricated several models to fit barriers of different sizes. ▲





Dan Vest's Buffer Sign Receiver

*By Wendy Schmidt, WST2
Training Coordinator-Operations
and Dan Sunde, Former Director
of Technology Transfer*

Dan Vest, Maintenance Technician, WSDOT Elma Maintenance Shop, has developed a quick and easy way to mount traffic control signs to the back of vehicles. About four years ago Dan's shop received a fleet of new pick-ups. Dan noticed that the old method of mounting signs to pilot and buffer vehicles was cumbersome and damaged the vehicles. So he started to look for ways to improve the mounting system. One weekend he noticed a car with a new bicycle rack that mounted to the existing trailer hitch receiver. Dan put two and two together and came up with a sign support system that mounts to a truck's trailer hitch receiver.

Dan found that a 2" x 2" perforated steel signpost fit perfectly into the trailer hitch receiver on their trucks. Since there weren't funds available for new materials Dan went to the scrap heap and scavenged damaged breakaway signpost sections. He welded two 16" long pieces into an "L" shape. One end of the "L" was inserted into the trailer hitch receiver with the other end vertical. One of the existing holes that aligned with the trailer receiver locking-pin hole was enlarged to $\frac{5}{8}$ " diameter to allow a $\frac{1}{2}$ " diameter bolt to be inserted to lock the unit into position. Next, Dan collected a 1x1 aluminum sign rod and tri-clamp that came with their cloth signs that the Shop didn't normally use. Dan mounted the 1x1 aluminum rod with two bolts into the vertical section of the "L". A sign was then bolted to the tri-clamp. Using the tri-clamp the sign could be quickly clamped to the

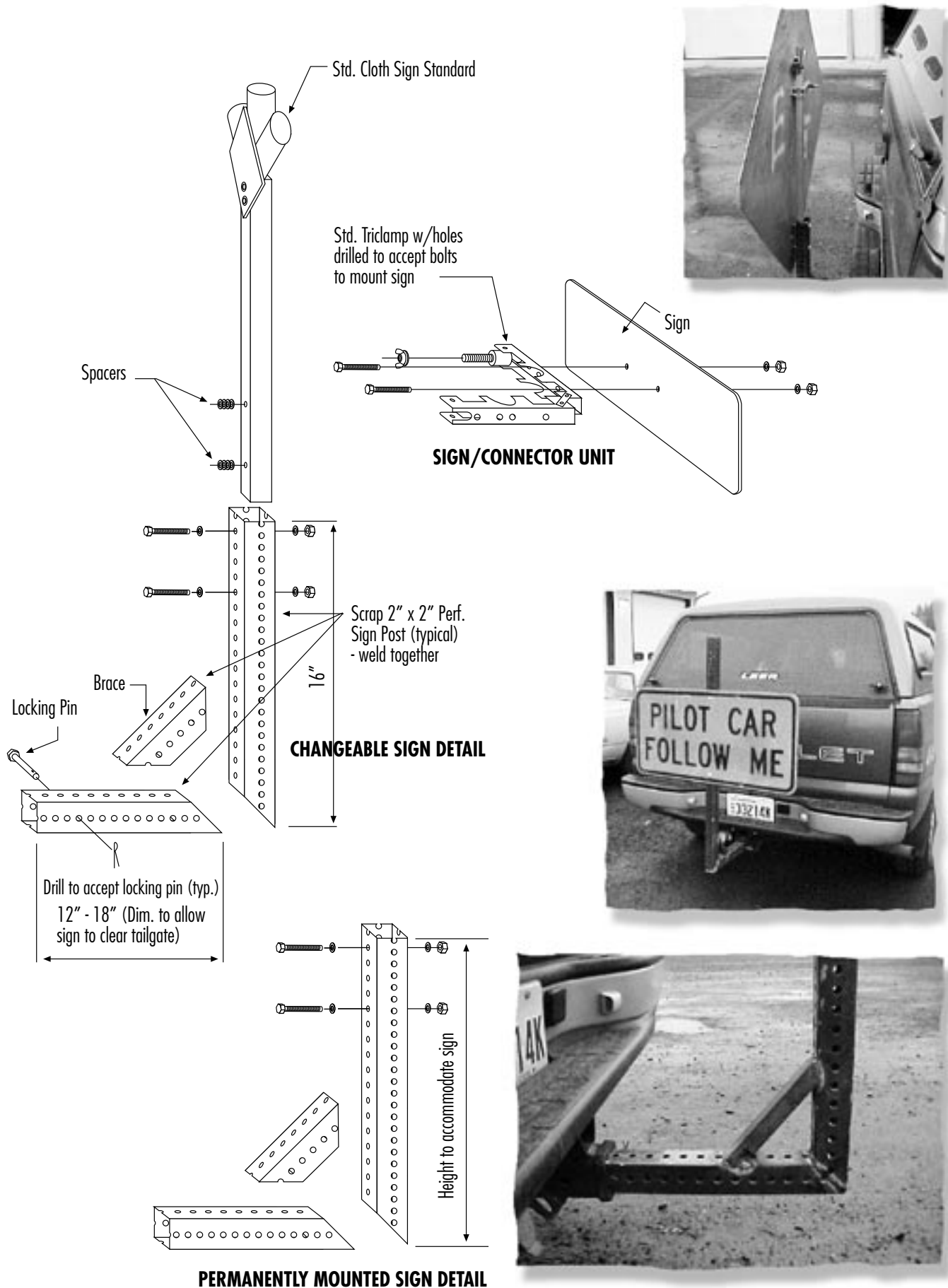


aluminum post when needed and unclamped when it needed to be changed. An additional benefit of using the 1x1 aluminum rod was it came standard with a three-flag holder at the top. This allows cautionary flags with wooden dowels to be mounted over the sign for added visibility. After presenting his idea to his supervisor, Tom Gibs, Dan got the nod to make it happen. Greg Schmidt, Maintenance Tech, was put to work immediately fabricating the first half dozen.

Over the past four years, Dan's Sign Receivers have become standard in the Elma Shop with different variations evolving around the original

concept. Signs that are used frequently forego the aluminum 1" x 1" rod and tri-clamp. Instead they use an extended vertical 2" x 2" post with the sign permanently bolted to the post. Height and extension of the 2" x 2" post varies depending on the clearance and sign height desired.

Signs are now mounted on trucks quickly and easily without damaging the trucks and they allow better access to the truck bed by allowing the tailgate to be opened. There are currently about a dozen permanent signs receivers in the Elma Shop along with the tri-clamp units. ▲



Bill Jantz'

Snowplow Stands and Lifting Lever

By Wendy Schmidt, Assistant Editor, WST2

Anyone who drives a snowplow or works in a local agency road maintenance shop and has to remove and remount the plow, possibly numerous times during the winter, knows what a job it is. When snowplows were unhooked from a truck in the WSDOT's Northwest Region, they were set on the ground and blocked up using wooden blocks. Plows with steel bits were stored resting on the steel bit with the hitches blocked up using signpost scraps and shims. Plows with rubber bits were blocked both in the rear at the hitches and in front at the plow supports just behind the blade to keep the rubber bit off the ground to protect them.

The drawback to the "old way" of doing things was that the plows were front-heavy and easily tipped forward or knocked off their supports. Because of the instability it wouldn't take much of a bump to cause a plow to tip or the hitch to fall to the ground. Then in autumn or early winter, with storms threatening, it's time to put the plow back on! What a job to get everything lined up! There had to be a better way!

Bill Jantz, Maintenance Technician II at the Washington State Department of Transportation Northwest Region Everett Maintenance Shop, came up with a combination of steel

stands that he welded onto the back side of the snowplow blade and at strategic points on the hitch to support the whole unit when it is disconnected from a truck for storage. He welded two stand assemblies to the blade, one on each end of the blade about a foot from the outside edge. They were angled forward to place the support in front of the center-of-gravity for stability. Then he welded two more to the hitch "V" supports, one on each side.

The stands themselves are quite simple: Bill used 2.5" x 2.5" square tubing for a sleeve, into which slides a 2" x 2" square tube with a plate "foot" welded on the end that acts as a stand. He drilled half-inch diameter holes through both the sleeve and the 2" x 2" tube stand and inserted a 3 1/2" or 4-inch pin with a cotter key to hold the stand in place. To stow the stands during use of the snowplow, another set of holes were drilled through the 2" x 2" tube about ten inches lower. This allowed the stand to be stowed up and out of the way by sliding it up through the sleeve and holding it in place with the pin when the plow is in use. When it is time to remove the plow from the truck, the pins are pulled, the 2" x 2" stands are slid down through the sleeves to the supporting position, and the pins are re-inserted. To make sure that the pins don't stray from where they are needed, Bill connected each pin to its sleeve

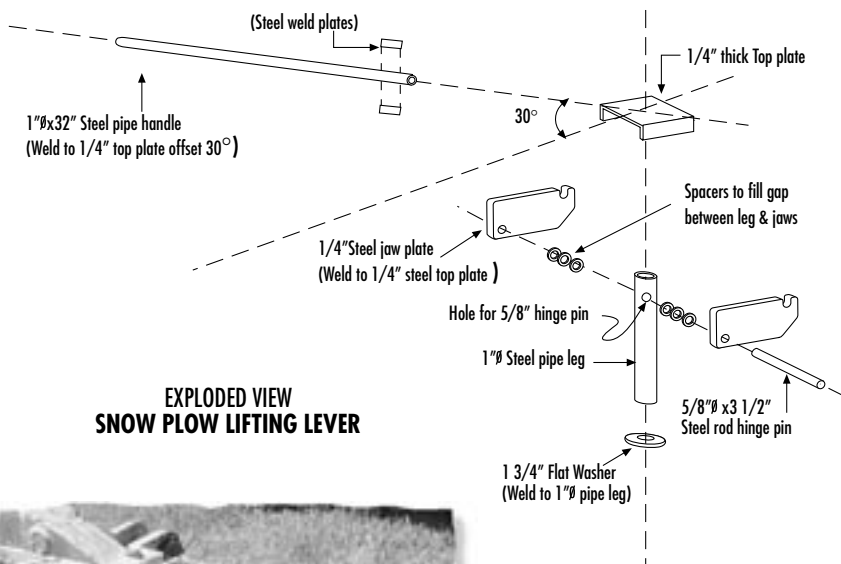


by welding an 8-inch long chain between the head of the pin and the sleeve. When the tube sections in all four of the stands are extended, the entire plow and hitch unit rests stably and securely with the bit just off the ground.

Bill also made a lifting bar-jack that permits easy, one-handed lifting of the plow's hitch when it is time to hitch it up to the truck. It works on a simple lever/fulcrum principle. It hooks under a rod welded horizontally onto the most easily accessible side of the sleeve of the stands on the hitch. When the handle is pushed down, the jaw plate raises the hitch for easy adjustment and fastening. It detaches and the action is repeated on the other side.

Bill reports that crewmembers are very pleased with the performance of the lifting bar/jack and the plow stands, too.

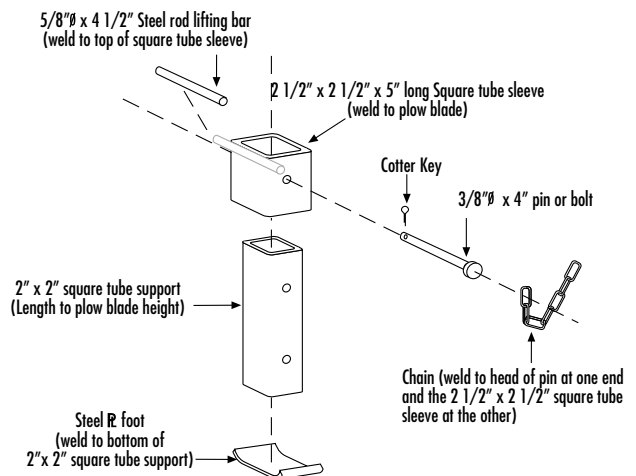
For more information, you can contact the WSDOT Everett Maintenance Office by telephone at (425) 339-1780, and ask for Bill Jantz. ▲



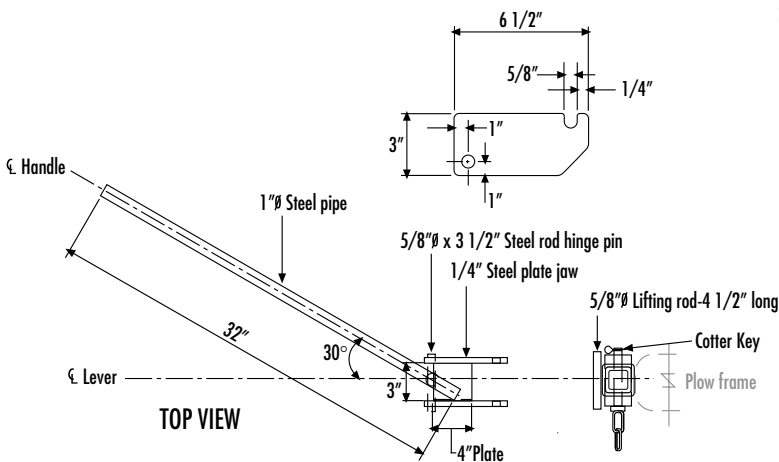
**EXPLODED VIEW
SNOW PLOW LIFTING LEVER**



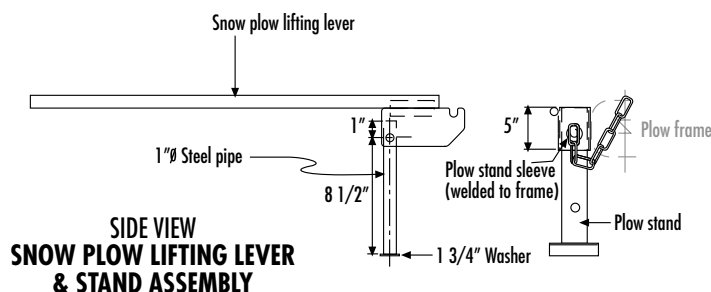
The bar jack handle is welded at an angle to avoid the truck's bumper.



**EXPLODED VIEW
SNOW PLOW SUPPORT ASSEMBLY**



TOP VIEW



**SIDE VIEW
SNOW PLOW LIFTING LEVER
& STAND ASSEMBLY**



This snowplow jack is angled for balance.

Jerry Lowery's Debris Pusher

Co-Authors: Jerry L. Lowery, Olympic Region Maintenance, and Jack Manicke, Staff Maintenance Superintendent, WSDOT Maintenance Office

Debris in roadway lanes is a major hazard to the traveling public. It can cause accidents and injuries as vehicles veer around or hit it, thus adding more congestion to already overcrowded highways. Removal of debris from roadways comes with exposure to traffic. This greatly degrades the safety of highway maintenance workers doing the removal. It also has an economic impact on the public through traffic delays and stoppages. As always, highway maintenance crews are looking for better and safer ways to keep traffic moving. These issues led to the development of the "Debris Pusher."

With this tool, one maintenance technician and truck can safely remove debris from a roadway at speeds consistent with traffic. This is achieved by approaching the debris at speed, then lowering the "Debris Pusher" to capture the material. The debris can be moved across multiple lanes, if necessary, to reach a safe place where it can be picked up and removed.

With on going use the "Debris Pusher" has shown itself to be a valuable tool for other maintenance projects. Here are just some of the jobs made safer and more efficient with its use: Sweeping operations, ditch cleaning, tree removal and brushing, and lastly cleaning catch basins and grates

under hazardous conditions. It has allowed these jobs to be completed quickly using less equipment and personnel.

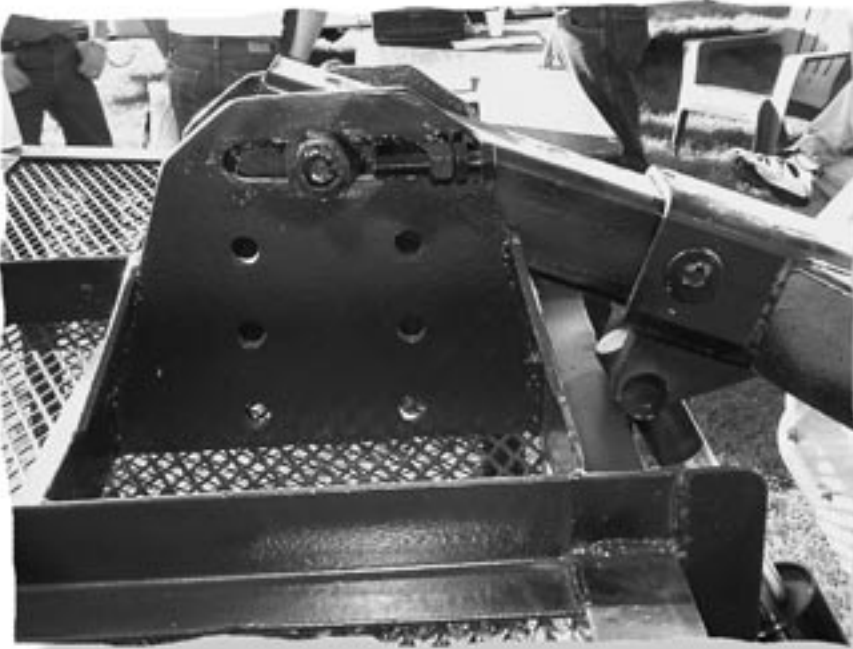
The "Debris Pusher" has shown itself to enhance employee safety, maintain traffic flow and reduce costs to maintenance organiza-

tions and construction companies. This truck attachment is simple, durable and an inexpensive piece of equipment with multiple uses in any highway program.

For more information or any questions or comments, please contact Jerry L. Lowery, WSDOT Tacoma, (253) 983-7550. ▲



Jerry Lowery (left) thought up the Debris Pusher, and constructed it with Jon Moergen, fabricator (right).



(Top Left) The Debris Pusher can scoop up debris laying in the travel lanes or on inside shoulders along barriers while traveling at highway speed. The driver captures the debris, then moves right, as traffic allows, to the outside shoulder, where the contents can be deposited and safely picked up.

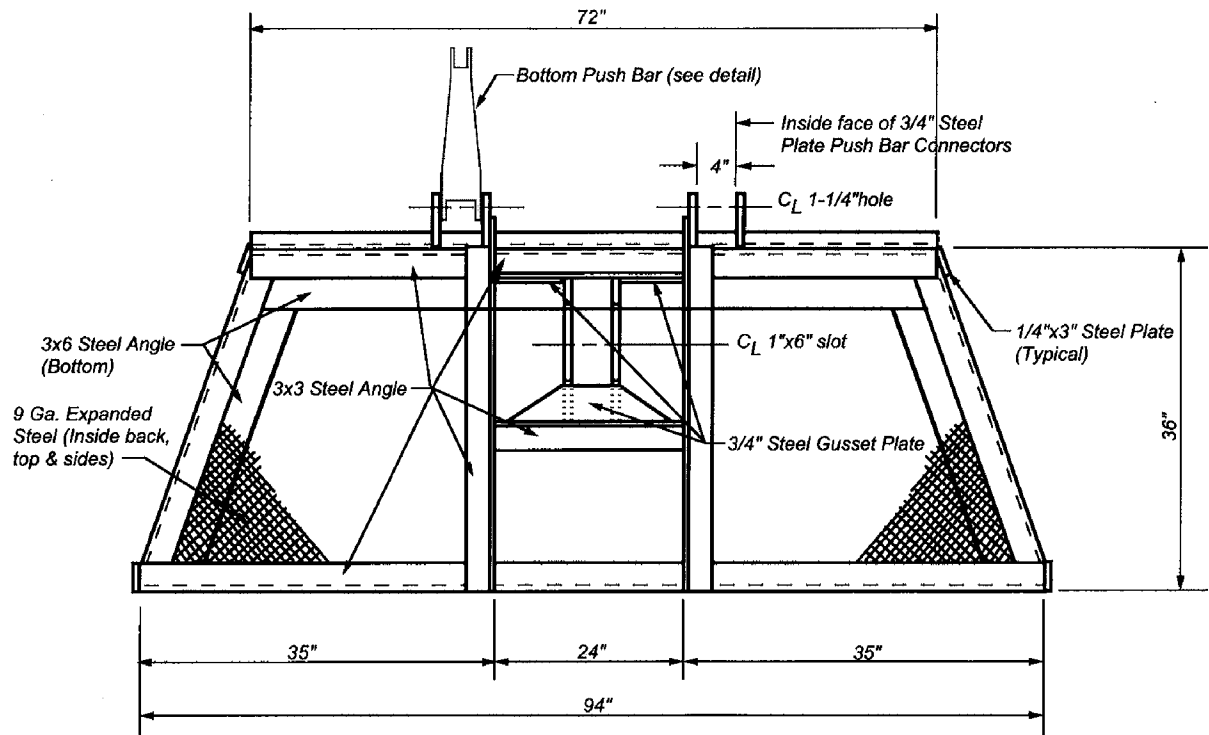
(Top Right) Close up of broom bristles.

(Lower Left) Close up of top assembly.

(Bottom) Side and front views.

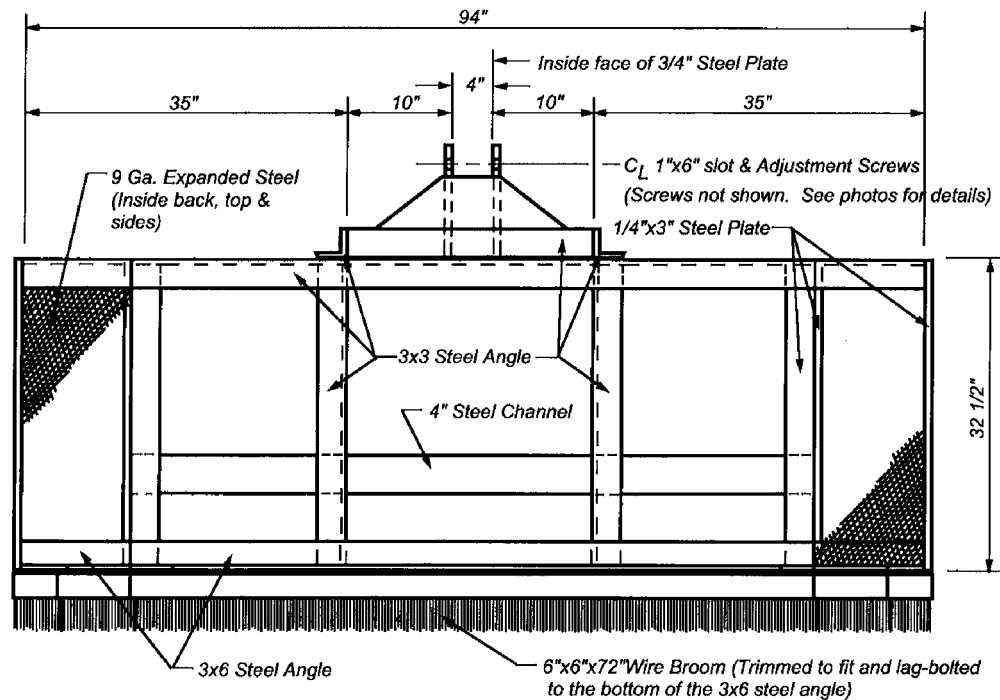
Photos by: Mike Evans and Dan Sunde



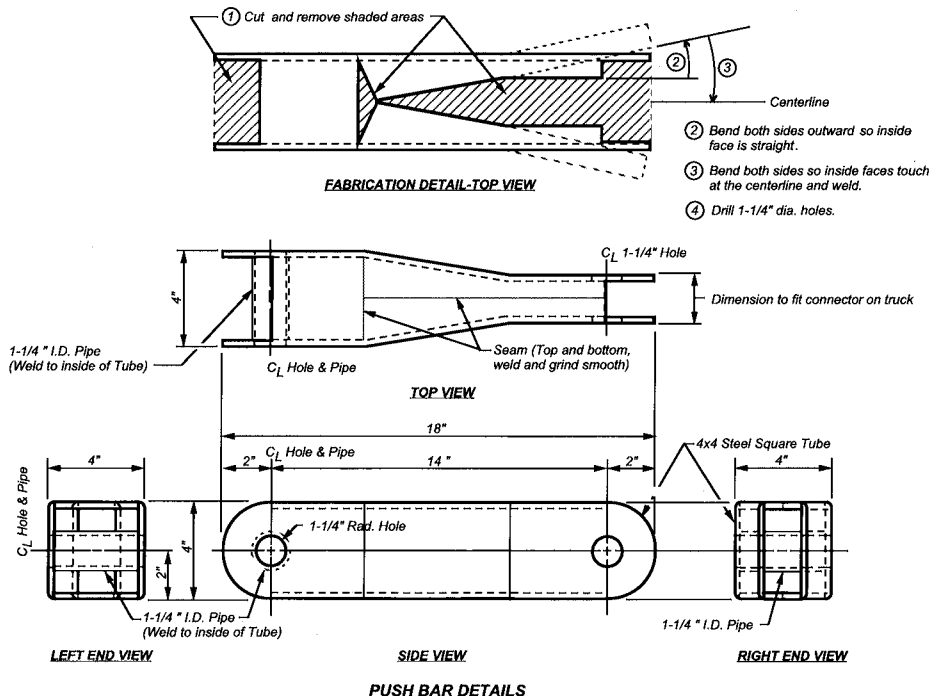


TOP VIEW

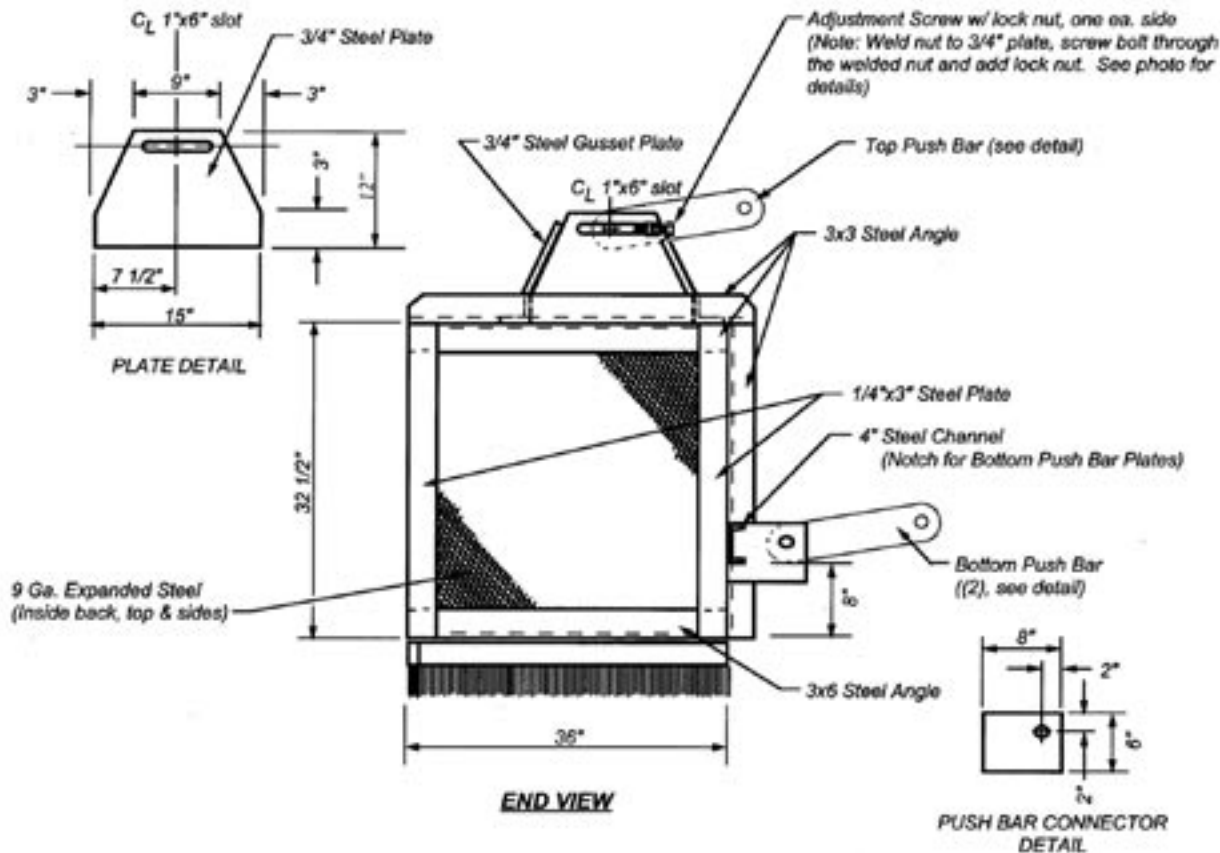
Note: Adjustment Screws not shown. (See photos for details.)
Dimensions are in inches.



FRONT VIEW



Dimensions are in inches.



Debris Pusher

Parts List

Pin	1 1/4" x 6"	4 ea.
Pin	3/4" x 6"	1 ea.
Bolt	3/4" x 4"	2 ea.
Lag bolt	3/16" x 1 1/2"	36 ea.
Nut	3/4"	2 ea.
Allthread	1" x 8"	1 ea.
Nut	1"	2 ea.
Safety pin	3/16"	6 ea.
Flatwasher	1 1/4"	8 ea.
Flatwasher	1"	4 ea.
Welding rod	1/8" rock mount AAA Polaris	10 lbs.
Primer	Zinc	1 gal.
Enamel	Equipment	1 gal.
Thinner		1 gal.
Traffic wand	2" x 24" yellow	2 ea.
Wire broom	6" x 6" x 72"	2 ea.
Wire broom manufacturer: United Rotary Broom, Kansas		
Part Number: 45-0406W 6' broom, 45-0407W 7' broom		

Materials List

Angle iron	3" x 3"	38 Linear ft.
Angle iron	3" x 6"	12 Linear ft.
Flat steel	1/4" x 3"	18 Linear ft.
Channel iron	4"	6 Linear ft.
Flat steel	1/2" x 12"	3 Linear ft.
Square steel	4" x 4"	8 Linear ft.
Expanded steel	9 gauge	60 Sq. ft.

Charlie Jensen's Snowplow Bit Changer

By Wendy Schmidt, WST2
Assistant Editor

Smashed fingers, sore muscles and twisted knees were the motivating factors behind an invention by Charlie Jensen, Maintenance Tech. II of the WSDOT Twisp Maintenance Shop in North Central Region. Charlie's snowplow "bit changer" began as "kind of a picture in my head" and became a device that converts changing bits on snowplows and graders from a 40-minute job involving heavy lifting to a safer and easier 20-minute undertaking. Jensen's Supervisor, Linda Dougherty, submitted the invention to the Washington State Technology Transfer Center as a "Better Mousetrap". It was selected as one of this quarter's "Better Mousetraps." A special recognition certificate, baseball cap, congratulatory letter, and a Highways & Local Programs coffee mug goes to the inventor.

During the winter months, the three carbide steel bits on the bottom edge of snowplow blades need to be removed and replaced every 4 or 5 weeks. Each bit weighs about 50 lbs. Usually, a person lifts a bit in to place with one hand and rests it on his knee or a wood block while slipping the bolts into place with the other hand, frequently resulting in pulled muscles, twisted knees, and smashed fingers. The 7-foot long, 150 lb. grader bits require a similar installation effort with a two-man crew. Charlie's bit installer lifts bits into place with minimal human effort in half the time. It's like an extra set of hands



Charlie Jensen with a bit ready to install. (Photo by Jeff Adamson)

on wheels! It makes the job of changing bits a lot easier!

Jensen's bit changer resembles a hand truck. "The only things I had to buy were the wheels," Charlie said, "the rest of the parts came out of the scrap bin." It is designed on the principle of a fulcrum point and weight. The bits are balanced by a counterweight that slides up or down the handle to raise or lower the plow bit. A blade is placed in a holder above and in front of the wheels. The holder swivels about an inch so the plow blade doesn't have to be lined up square.

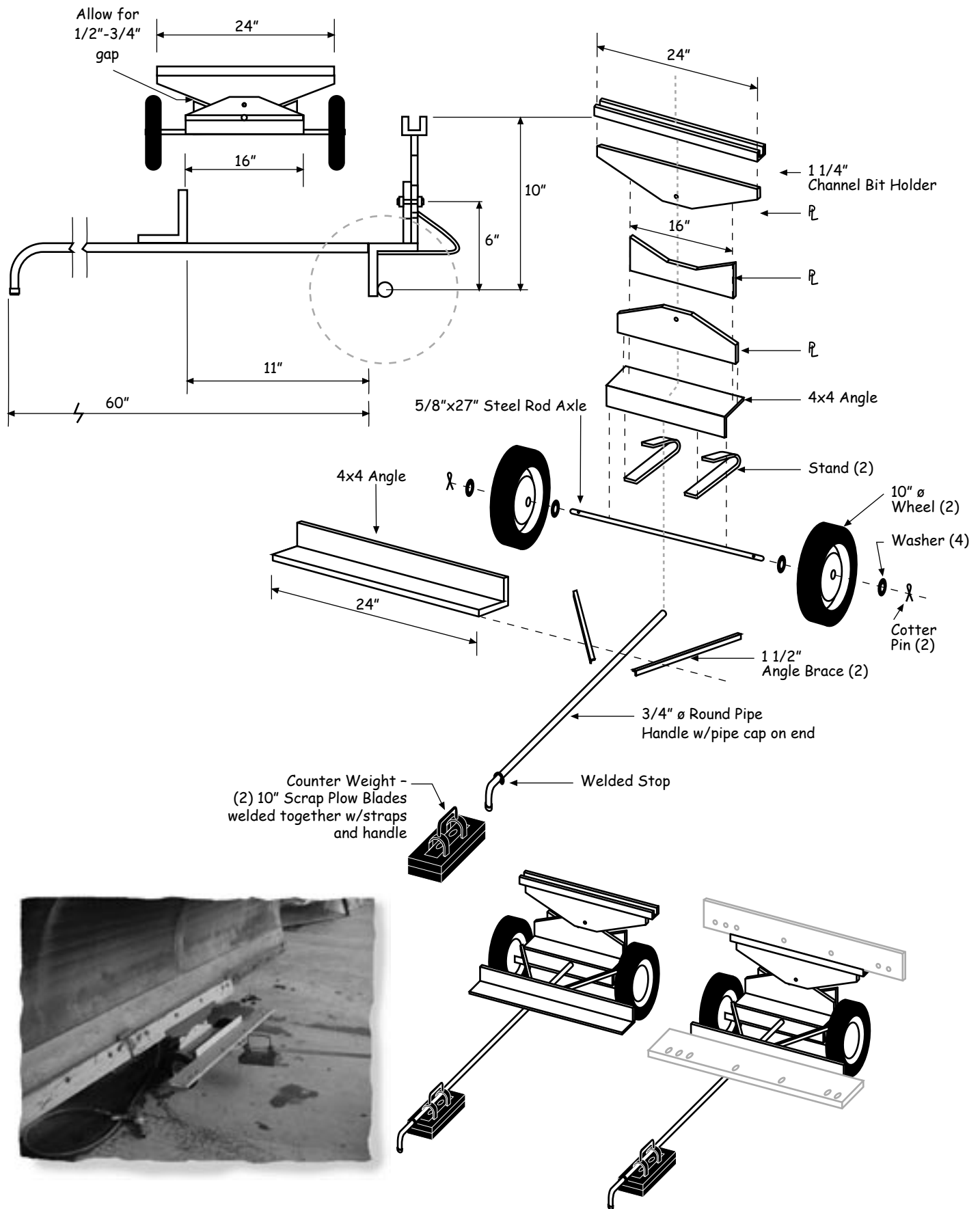
When the holder is rolled up to the face of a snowplow blade, the counterweight is slid up the handle length. The farther up the handle the counterweight goes, the higher the holder containing the plow bit rises. The handle is bent down-

ward at the far end to provide a "third foot." When the holes on the bit line up with those on the plow blade, the operator is free to insert the bolts—all without having to lift the bit! The counterweight has its own handle to make sliding it easy!

The device also has a handy carrying table made of a 2 foot long section of 4-inch angle iron, which is welded on the handle side of the wheels. It will carry all three bits needed in a single trip from the supply pallet. Diagonal braces of 1 1/2 inch angle iron provide support for the handle. ▲

For more information, you may contact Charlie at (509) 997-3081.

A special thanks to Jeff Adamson, Communications Manager WSDOT North Central Region, in Wenatchee, for his contribution to this article.



"A steel bit in place for installation."
(Photo by Jeff Adamson)

Errol Rhode's Snowplow Emergency Light System

*By Dan Sunde, Former
Director, WST2 Center*

During snowplow operations the WSDOT South Central Region Maintenance Office identified a serious safety problem. When the operators turned on their flashers to make their plows visible to other drivers on the road, the turn signals and brake lights were difficult to see. With two rotary beacons on the cab, alternating flashers in the tail lights and the running lights all turned on at the same time, the snow plows were highly visible but the brake lights and turn signal lights would get lost in the myriad of lights. This made it difficult for other drivers to see when the plows slowed down, prepared for a turn, or changed lanes. One safety feature was hindering another. To add to the problem, snow would build up on the lights, requiring them to be cleaned off regularly.

Errol Rhode, mechanic for WSDOT South Central Maintenance Shop in Yakima, came up with a very effective solution. Errol developed a light bar assembly that mounts high on the back of the hopper with a switch connected to the plow's brake and turn signal system. The switch turns the alternating flashers off for 2 seconds whenever the brakes are applied or the turn signals are used. This alerts the surrounding drivers that a change is occurring and isolates the plow's brake lights and turn signals.

The heart of the light delay system is the weathertight junction box mounted at the center of the stainless steel light bar. It contains an adjustable relay set for a 2-second delay and an alternating flasher unit wired to the snowplow's standard 7-wire trailer cable through a ten-pair terminal strip.



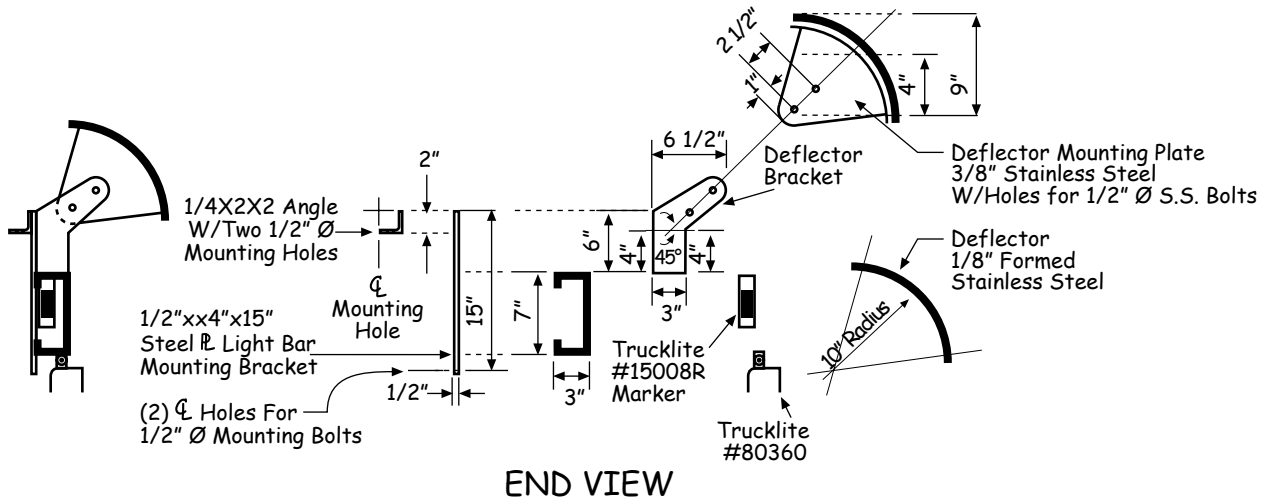
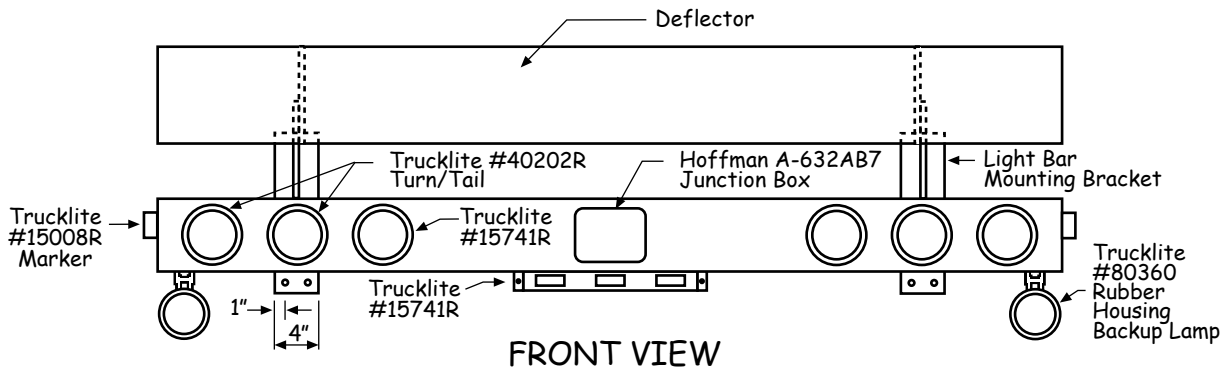
Errol stands beside a completed light bar and air foil assembly.

Errol also designed an air deflector that blasts air over the face of the lights, that effectively keeps snow from accumulating on them. Both the lighting and air deflector assemblies are fabricated from stainless steel and are mounted high to prevent corrosion.

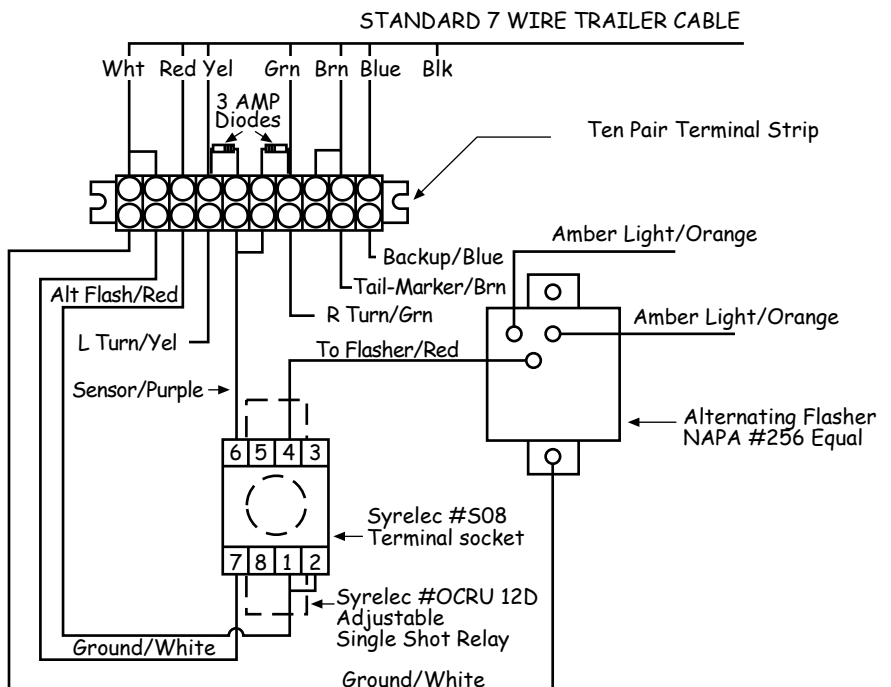
The system has been so successful that the design is now standard

on the entire South Central Region snowplow fleet. Hoppers are ordered without lights. The light bar and airfoil assemblies are fabricated in the WSDOT SCR Maintenance Shop and added to the hoppers. (See photos.) ▲

For additional information, you can contact Errol at (509) 577-1975.



Junction Box Wiring Diagram



Patrick Zellner's and James Pryor's

Tack Distributor Waste Diesel Recycling System – Recycling By Recycling

For years the city of Renton has cleaned their CSS1 Tack Distributor using fresh diesel fuel in order to keep the system pump and hose from plugging up. The flushing processes resulted in 800 to 1,000 gallons of tack/ diesel waste that had to be disposed of as hazardous material at a disposal cost of \$7,000 to \$10,000 per year.

Patrick Zellner, City of Renton Lead Maintenance Worker III, noticed that as the dirty tack/ diesel mix sat in storage, the tack material settled and fairly clean diesel floated to the top. Patrick got together with his co-worker, James Pryor, Maintenance Worker III, and they came up with an amazing piece of equipment and a process that saves money, fuel resources and the environment by filtering and recycling the used, dirty diesel.

What Patrick and James have developed is a process that allows the asphalt and diesel to separate. This is done in three phases along with a modified initial cleaning step for the Tack distributor.

The first step in cleaning the distributor equipment has been modified. Now the operators push the residual tack remaining in the hose back through the hose into the tack tank using the cleaning diesel, stopping just short of the cleaning diesel entering into the tack tank itself. This removes most

of the tack that would have needed to be removed and disposed of during the recycling process itself, without polluting the tack with diesel. This has greatly reduced the amount of waste tack needing to be separated during the recycling process.

Once the distributor is cleaned, the separation process begins. In the first phase, the tack/ diesel mix resulting from the distributor flushing process is allowed to sit for a period of time to let the asphalt tack settle to the bottom of the 55-gallon drums it is stored in. In the next phase, after the initial settling occurs, they pump the partially cleaned fuel from the top of the 55-gallon drums through a series of two filters and store the filtered diesel in a tank for future use. In the last phase, when the filtered diesel is needed for cleaning the tack distributor again, the fuel is drawn from the tank and passed through a final filter. After cleaning the tack distributor with the recycled diesel, they start the process all over again.

Pat says the process reduces 55 gallons of tack/ diesel mix to about 15 gallons of tack waste and 40 gallons of recycled diesel fuel. He says the fuel can be recycled almost indefinitely. Pat is currently investigating methods of recycling the waste tack material, too.

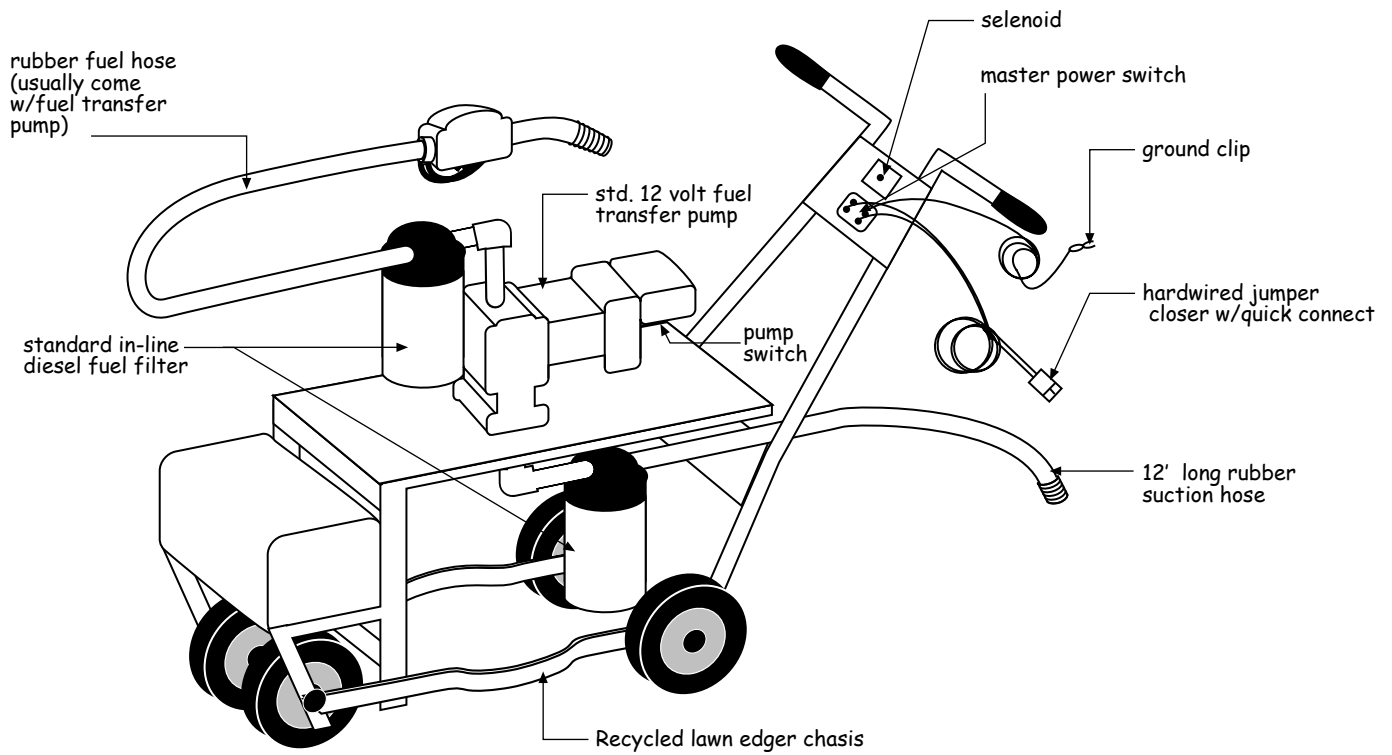
In order implement the process, Patrick and James invented the equipment to make it work. To pump the mix they mounted a 12-volt diesel pump onto an old lawn edger frame (also recycled). Two inline filters were added, one on the inflow and one on the out flow side of the pump (see Diagram). To power the pump they added a 12-volt battery to the frame with hard mounted quick connect jumper cables to connect to a battery charger. On the upstream side they connected a 12-foot suction hose and on the downstream side a hose with a standard fuel nozzle.

The storage tank was made of a (you guessed it) recycled 116-gallon home fuel tank found dumped along the shoulder of a road. It was cleaned, sand blasted, painted and mounted on a stand. A third filter was attached between the gate valve and the hose at the outflow of the storage tank. The tank is well marked so that the recycled fuel is not misused.

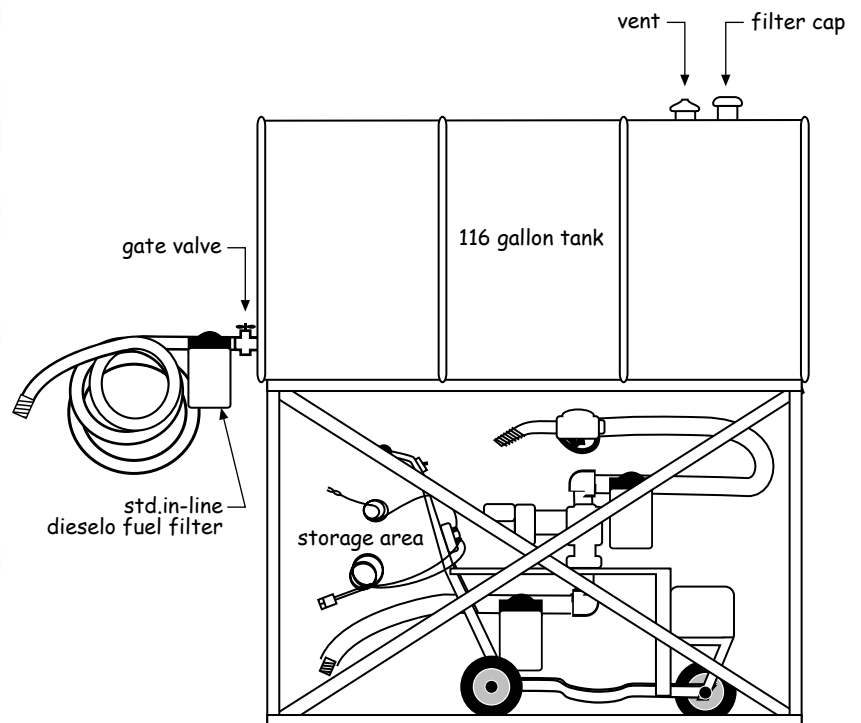
The pump dolly is stored under the storage tank.

Patrick notes, "The system works great! I am working on reusing some of the tack and have had some success filtering and settling it out. That's another invention to come."

If you have questions or would like information on the system, you can contact Patrick or James at (425) 430-7400.



Patrick Zellner with Renton's Diesel Filtering Recycling System (Photo by Bill Wressel)



"I encourage everyone to reuse, recycle and to 'rethink' our methods and procedures, to streamline and conserve. Time changes everything and we all need to help with the changes and adapt to a smarter, more efficient world. Take the challenge... and have fun!"

Patrick Zellner, Lead Maintenance
Worker III, City of Renton

Jimmye Crawford's Breakaway Sander Spinner

By Wendy Schmidt, Assistant Editor WST2

Icy roads are a hazard faced by drivers on miles and miles of Washington's roads each winter, so a sand truck is a welcome sight to many motorists. Sand is fed from the truck bed down to a spinning plate, where it is thrown out horizontally in a circular pattern. The truck driver can adjust the speed of the spinner hydraulically but can't move the spinner to protect it from damage. In the past, the spinner assembly was susceptible to impact damage from hitting objects during operations.

Originally, the spinner shafts were rigid, so when the truck crossed a median, hit a rock or something else solid, the spinner shaft would bend. Often that meant the whole unit was ruined, or a new shaft and spinner would need to be installed if the motor could be salvaged. To prevent damage to the spinner, its shaft, and the hydraulic motor, the WSDOT South Central Region Yakima Maintenance Shop developed a spinner assembly that would swing forward or backward when the spinner hit something in the road. This idea allowed the unit to swing when bumped without being damaged, but it had a weakness: it wouldn't return and hold in a vertical position.

About three years ago, Jimmye Crawford, Equipment Mechanic for the WSDOT South Central Region's Yakima Maintenance

Shop, designed and built a spring-loaded breakaway sander spinner for use on tandem axle hopper trucks. Jimmye's spring-loaded design is easier to build than its predecessor, resists corrosion and returns the shaft to its original vertical position quickly and consistently.

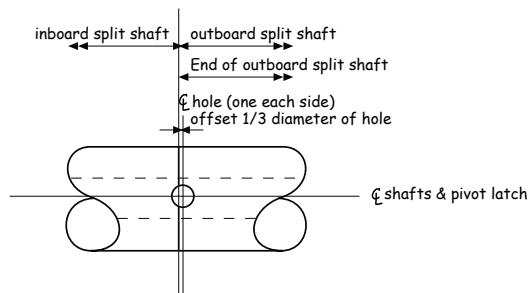
Jimmye's design incorporates a two-section split shaft with two pins welded onto opposite sides of the outboard shaft section. The pins sit in offset holes drilled through both shaft sections. The two shaft sections are pressed together by a compression spring slid onto a one-inch diameter threaded rod that runs through the two shaft sections along their axis. The threaded rod and inboard shaft section are welded to a vertical bracket that mounts to the truck frame. The spring is held in place between two washers, and is held tight with a nut and cotter pin. The Hydraulic spinner motor sits on a bracket assembly that is welded to the outboard shaft section, and is suspended below it. The spinner shaft and spinner disk hang below the motor. (See diagram and photos).

On double axle trucks (ten-wheelers), the system is mounted on the truck frame in front of the truck bed on the drivers' side. On single axle trucks, it is mounted to the dump bed sub frame, which is 6 or 7 inches higher off the ground than the frame of a double axle

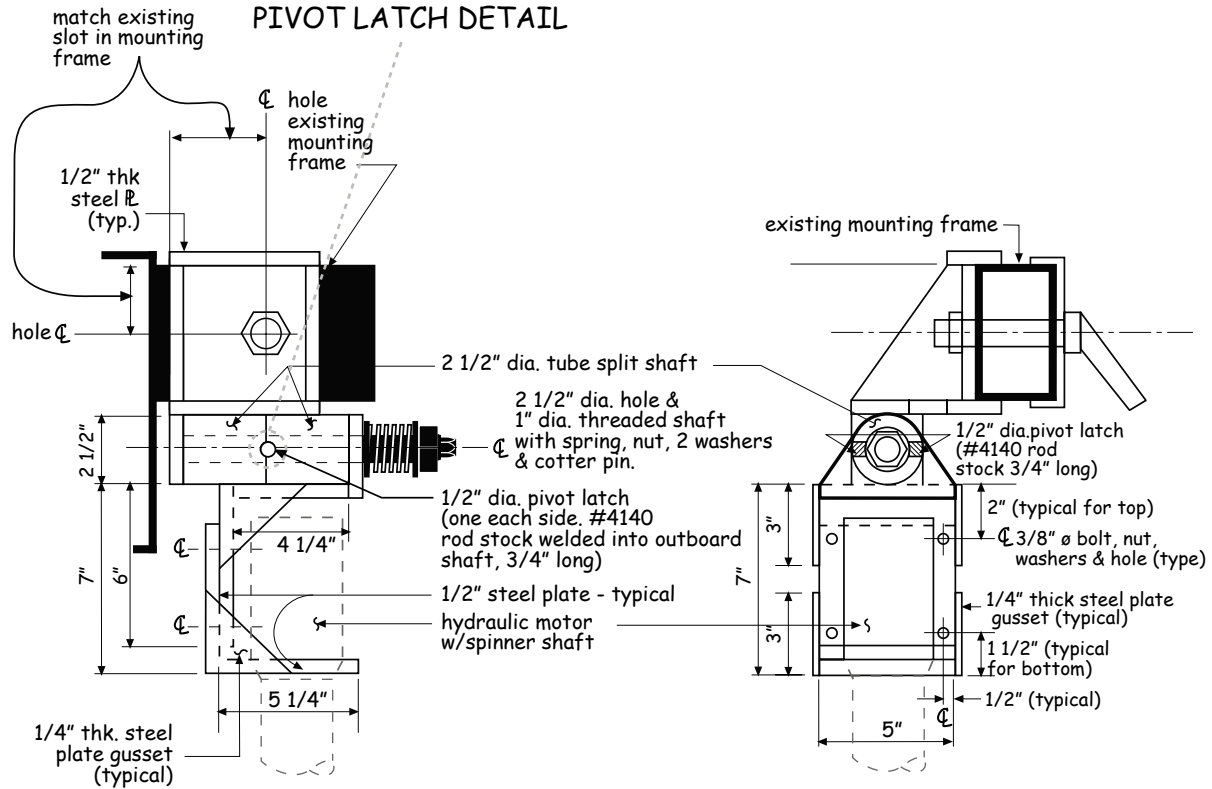
truck. For this reason, Jimmye built another model for single axle trucks with a longer spinner shaft. That way the spinners ride at the same height above the ground on both truck types. Placing the spinner in front of the truck's rear wheels helps the sander truck's own traction.

Here's how the breakaway spinners work: when an object hits the spinner, it kicks the spinner either backward or forward, parallel to the truck frame. As the spinner shaft tilts, it rotates the out-board shaft, dislodging the pin from the slot of the inboard shaft section. This, in turn, loads the compression spring. Once the spinner clears the object, the weight of the spinner brings it back down so the spinner shaft becomes vertical. The pin re-engages the slot in the inboard shaft, and the compression spring holds it there. The spinner continues to turn and spread sand across the roadway. So, hitting a rock or big chunk of ice in the roadway with the spinner is no big deal anymore! The shaft is simply pushed out of the way, then it returns to vertical and snaps into place as if nothing happened!

Thanks to Jimmye's inventiveness and administrative support from Errol Rhode, Equipment Supervisor, the WSDOT South Central Region has saved equipment, time and money! Thank you for sharing your creative solutions with us! What will these fellows come up with next??



PIVOT LATCH DETAIL

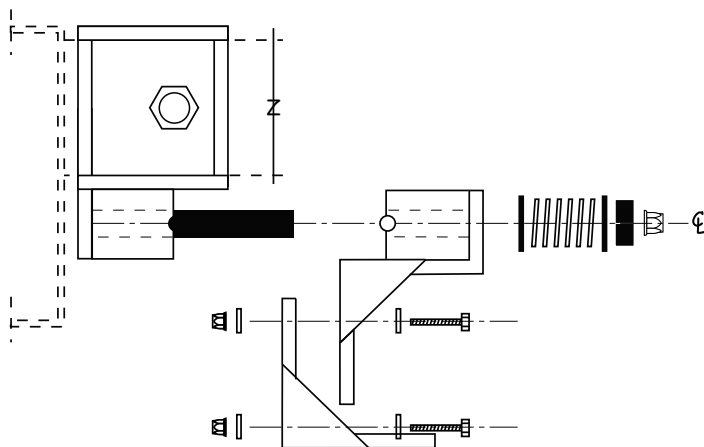


FRONT VIEW

Looking normal to truck frame from side of truck.

SIDE VIEW

Looking along centerline of truck frame from back.



EXPLODED VIEW



WSDOT Davenport Maintenance Shop's Culvert Template

Tom Page, Maintenance Lead Tech, WSDOT-Davenport Shop, has the honor of having submitted the very first Better Mousetrap for the WST2 newsletter! It's a mousetrap that proves a great idea doesn't need to be complicated.

One of the duties of the WSDOT maintenance forces is to paint pavement markings to locate culverts. Maintenance crews originally had to bend over to lay the paint template down to paint the marking and then bend over again to pick it up. With a lot of culverts to mark, the Davenport crews found the constant bending to place and pick up the template caused back strain.



The maintenance techs came up with a very simple solution using available materials in the shop. Using a handle from a litter picker, worn out sign sheeting, and few rivets the crew created their Culvert Mark Template, simple template with a long handle. It's easy to make, compact, saves time and most importantly, eliminates the need to bend over saving your back.



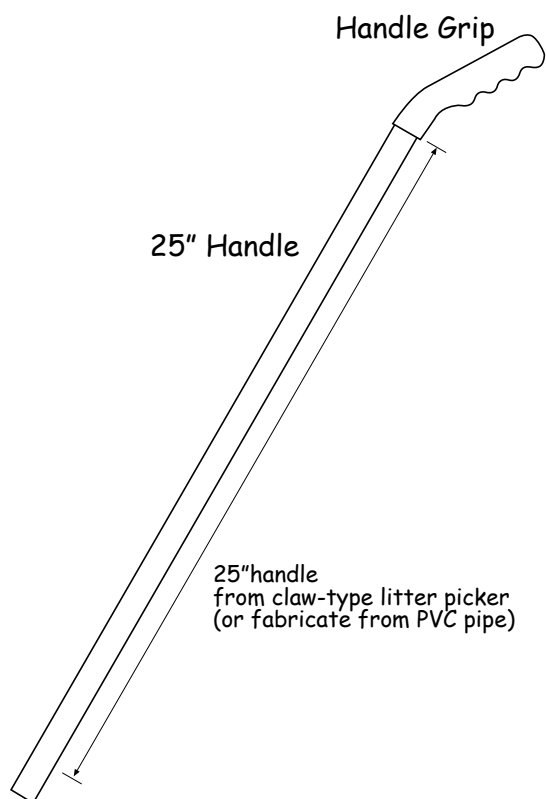
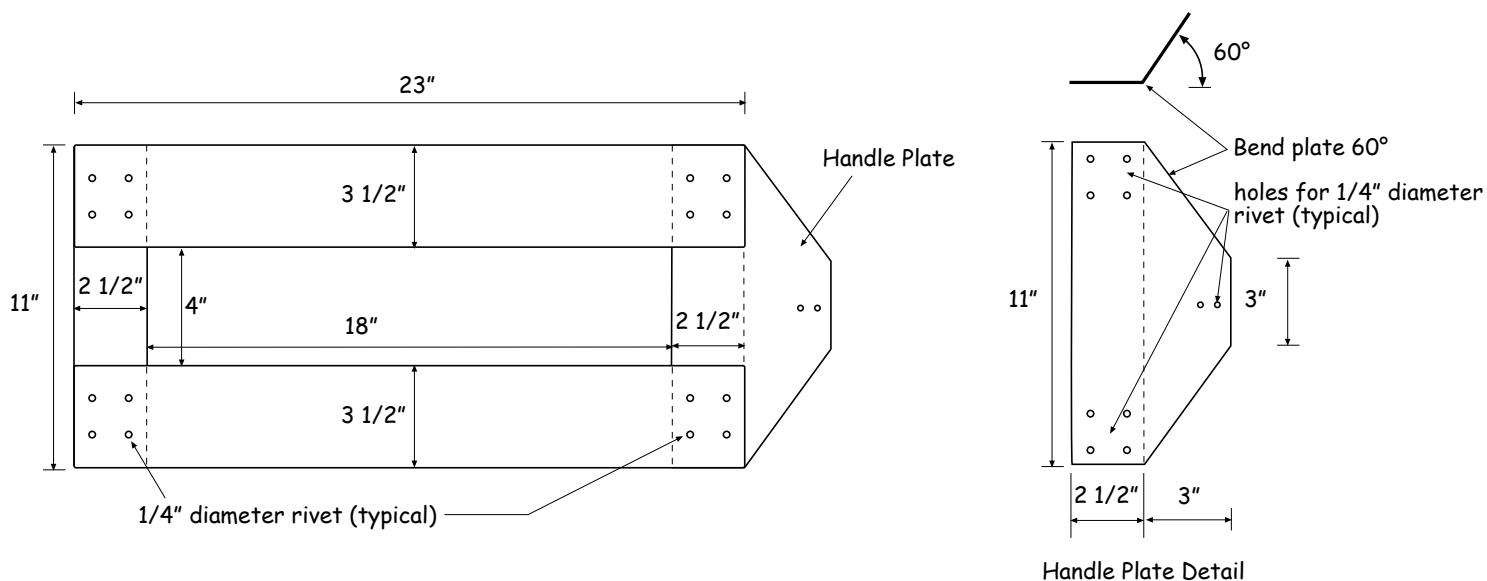
To make one of your own just cut pieces of a worn out or scrap sign sheeting into plates and rivet them together with $\frac{1}{4}$ " rivets. (See illustration for details.) Then, attach a claw-type litter picker handle or a section of $\frac{1}{2}$ " diameter (or larger) plastic pipe as shown to form the extension.

Tom notes, "The template works well and makes the job quicker with no back strain."

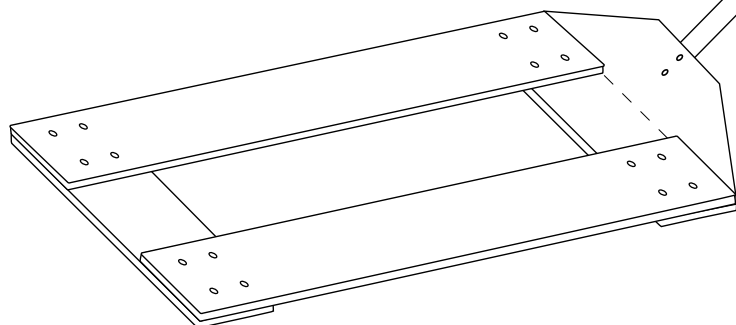
For more information, you can contact Tom at (509) 324-6583.

Tom Page with the template at the PNW Transportation Technology Expo last September 2000.

So simple! So Functional!



(Note: This is an early version of the paint template. For details on how to build the newer version see the illustration)



Bill Jantz'

Catch Basin Grate Jack

Bill Jantz, Maintenance, Tech II of the WSDOT Marysville Maintenance Shop, has developed a handy tool for removing catch basin grates. After sitting in place for a while, catch basin grates tend to get "cemented" in place with fine sand, or they just fit tightly. Breaking them free and pulling on them to remove them can be difficult, and poses a potential for serious back, shoulder and arm injuries. Bill came up with a tool to help--the Catch-Basin Lid Jack.

Bill's C-B Lid Jack is a 1-inch steel bar with a T-handle at one end and a hinged T-collar at the other. A 2³/₄" long x 3³/₈" plate "heel" is welded several inches away from

the hinged T-collar to provide a fulcrum. The bar is bent 15 degrees at the "heel" to provide better leverage. The "Tee" shaped collar is attached to the end of the bar with a bolt to allow the collar to hinge. A person can insert the tool through the slots in the lid without bending over. See the illustration and photos for details.

Using a C-B lid jack is simple. The Tee-collar is inserted into one of the slots in the grate, then slid to the end of the slot. The jack is then turned one-quarter turn to align with the direction of the slot and engage the tee collar. The bar handle is then pushed toward the ground. This places the jack with

"heel" resting on the edge of the concrete basin, the collar locked in the lid and the handle slightly off the ground.

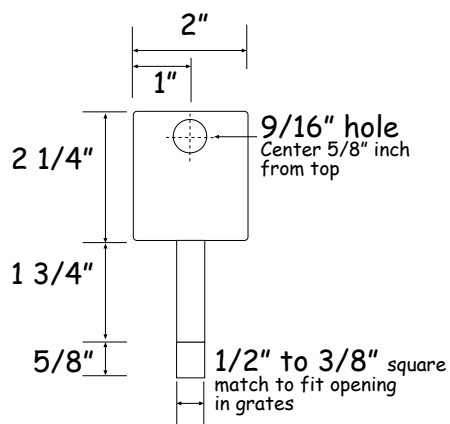
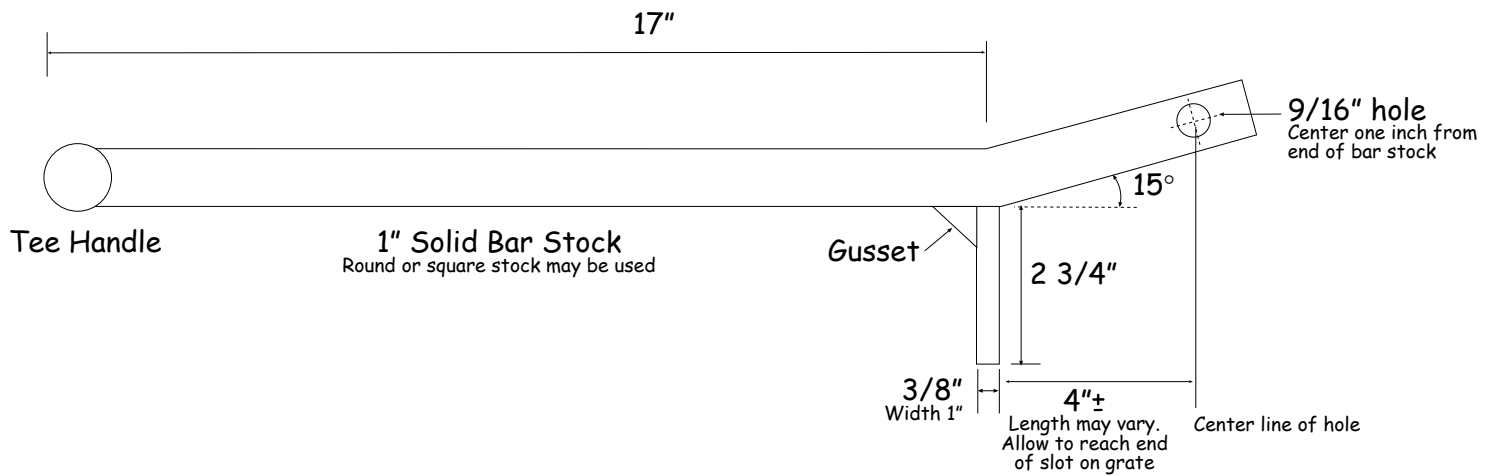
The person then steps on the handle, which forces the catch basin grate upward. A few pounds on the lid with a hammer and the lid should be loose. Once free the lid can be dragged away by pulling it with the T-handle.

Bill says, "It works excellent. It pulls the lid up from the short leverage point which greatly increases the pull."

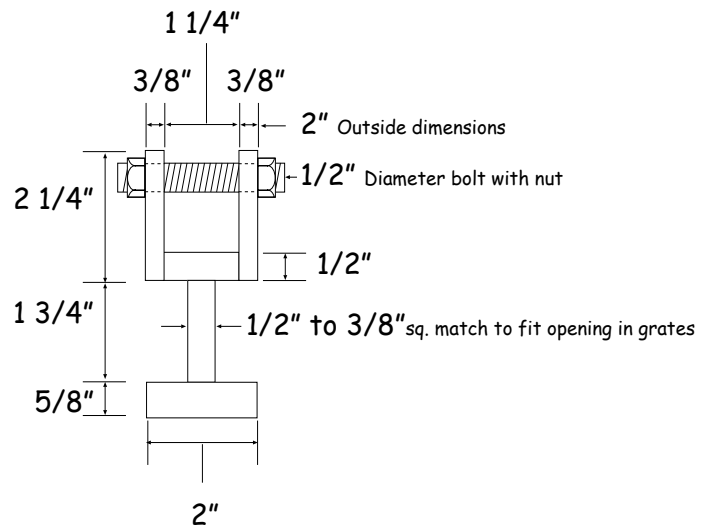
For more information, you can contact Bill at (360) 652-8135.



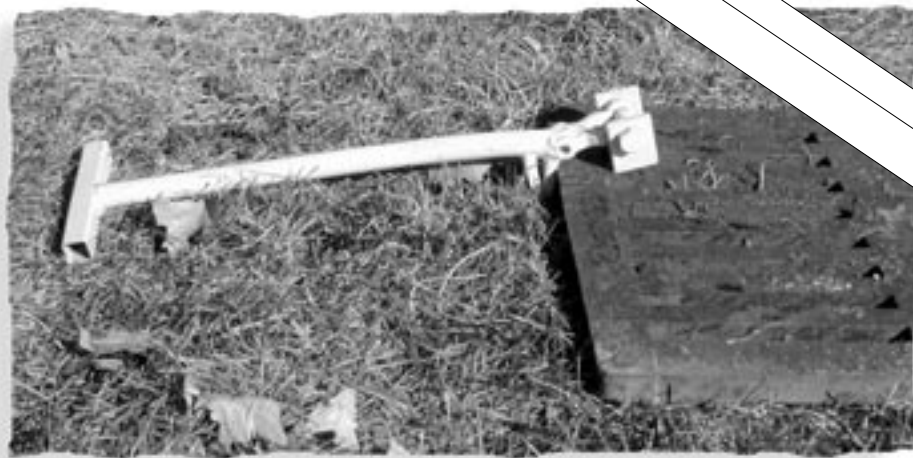
Bill's catch basin grate Jack being demonstrated at the PNW Transportation Technology Expo at Moses Lake, Washington, in September, 2000.



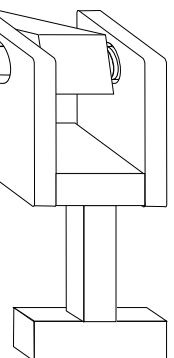
Side View



End View



*The C-B Jack in place
(Note: This is an early version of the jack. For details on how to build the newer version see the illustration)*



Registration

Name of Invention: _____

Agency: _____ (WSDOT) Region: _____

Mailing Address: _____

City: _____ State _____ Zip+4: _____

Contact Person: _____

E-mail Address: _____

Phone: () _____ Fax: () _____

Inventor(s)/Fabricator(s): _____

E-mail Address: _____

Phone: () _____ Fax: () _____

Supervisor's Name: _____

What prompted this invention (or equipment modification)?

How was it developed?

Labor, Equipment, Materials Used (from scrap pile? Did you purchase any parts?:

Cost Estimate (a rough guess will do):

Benefits to your operations:

Include sketches or plans of your "Better Mousetrap" with dimensions and materials identified, and photographs of the item from all angles (front, top, side, etc.) with the inventors if possible, to:

Build a Better Mousetrap
WSDOT-WST2 Center
PO Box 47390
Olympia, WA 98504-7390

For more information and photos of Mousetraps and Expo, check the Washington State T2 Center's web page:
www.wsdot.wa.gov/TA/T2Center/t2hp.htm
or contact Wendy Schmidt at (360) 705-7386 for details.

Distributed by:



**Washington State
Department of Transportation**

Highways & Local Programs Division
Washington State Technology Transfer Center
P.O. Box 47390
Olympia, WA 98504-7390

Phone: (360) 705-7386

Fax: (360) 705-6858

E-mail: WST2Center@wsdot.wa.gov